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Welcome

Welcome to the Final Year Projects Display of the graduating class 2010 of Computer Applications. Details of the students and their respective projects can be found within this booklet.

The projects put into practice the knowledge gained during our time here in DCU.

Projects cover many disciplines within computing, and are inspired by time spent on INTRA, staff research interests, collaboration with companies and original concepts. These projects demonstrate the hard work and innovation that can be found within the students of our class.

We would like to extend our thanks to lecturers, supervisors and the support staff for all their help and assistance throughout our time here. Without their support we would not be here today.

We would like to thank the sponsors of this event: the Centre for Software Engineering and ComputerScope. With their sponsorship they are showing a belief in the ability of graduates and a commitment to the future of the industry.

And last, but not least, we would also like to thank the visitors and the companies they represent for showing an interest in our work – we hope you enjoy it!

Graduating Class 2010, Computer Applications

DCU School of Computing
On behalf of the School of Computing, I would like to welcome you all to this year’s Final Year Projects Display of the Class of 2010.

Today, we have the opportunity to recognise and celebrate the work of these students. We all go through many stages in our careers and lives, and today, for these students, marks the transition from one of those stages to the next.

With the computer industry growing and changing at a rapid pace, especially in this country, we believe that the range of Final Year Projects on display today reflect this. Indeed, many of the projects displayed represent products with commercial potential.

For the students: Congratulations and well done! Some of you will now go on to careers within the software engineering, IT or other sectors of the Irish economy; others will continue your formal education either here within the School of Computing or elsewhere; some may travel across the world; and some may even choose a career as far from technology as possible; but we hope that all of you will look back with fondness at your time here at DCU, and also – and perhaps more importantly – at the friendships you have made here.

We, the staff, here within the school always enjoy hearing how former students are developing their careers, and we all encourage you to enjoy your career, but also to stay in touch!

For our guests: Thank-you for taking the time to join us here today. We hope that you enjoy your visit, and are impressed with the depth and breadth of the work that the students are presenting. Impressive though they are, these projects represent only a small part of the work that the students have carried out over the last few years.

DCU is well-known for its strong relationship with industry, and we hope the students you meet here today will go on to have a strong impact on the various industries and sectors you represent.

The staff and students of DCU School of Computing look forward to meeting you and sharing these projects with you, and we hope you enjoy your visit to the School of Computing and Dublin City University.

Prof Mike Scott
Head, DCU School of Computing
Taking Students on INTRA Work Placement

Relevant work experience through DCU’s INTRA (INtegrated TRAining) programme is a central feature of education at DCU and an integral part of most of the University’s undergraduate degree programmes. Students from the B.Sc. in Computer Applications are required to complete a six month INTRA placement at the end of third year, from April to September inclusive. Students from the new B.Sc. in Enterprise Computing are required to complete a year long INTRA programme in 3rd year.

Why Hire a Student?

Every year, employers in Ireland and overseas hire more than 800 students from DCU for an INTRA placement. Ranging in size from the largest multinational, to the sole trader start up, these employers are convinced of the merits of choosing DCU students and come back to INTRA year after year. INTRA provides the following opportunities for an employer:

- Provides a supply of highly motivated young people who have proven that they can make a real contribution
- Provides an opportunity to evaluate and train possible future employees
- Frees existing staff from time-consuming but essential tasks
- Allows relief or assistance during seasonal peak work loads
- Permits new projects to be undertaken
- Develops existing staff by providing mentoring opportunities
- Raises awareness of your company and products/services on campus
- Provides an ideal opportunity for employers and academics to establish long-term relationships and the potential for working together on projects
- Provides an opportunity for involvement in the development of graduates with the required key skills essential to the Irish economy
- Helps to promote and reinforce a lifelong learning culture within an organisation through the establishment of strong links with a third level institution

Student Knowledge and Aptitudes

The objective of the B.Sc. in Computer Applications and B.Sc. in Enterprise Computing degrees is to produce qualified computing professionals who:

- Have a capacity to adapt, change and keep abreast of new developments
- Have a sound understanding of computer hardware, software engineering and computer programming
- Have a sound understanding of the techniques of systems analysis and design and of quantitative methods
School of Computing
Final Year Projects

Expo 2010

- Are thoroughly familiar with the use of computer technology in various administrative systems, in manufacturing systems and in management decision making
- Have a sufficient understanding of the ideas underlying areas such as artificial intelligence, robotics and computer-integrated manufacturing

Work Areas

Students from the B.Sc. in Computer Applications and future students of the B.Sc. in Enterprise Computing have/will have the ability to work in many computing roles, some of which are listed below:

- Programmer
- Systems management
- Modifying existing packages and producing new ones
- Computerising of service records on statistical systems
- Analysing computer systems
- Training personnel in the use of new programmes
- Preparing workshops for users
- Developing database systems

Full details of the DCU INTRA programme are available at: www.dcu.ie/intra.

Employing Graduates of the B.Sc. in Computer Applications

DCU’s Careers Service offers a comprehensive employment service for companies wishing to recruit graduates of the B.Sc. in Computer Applications as well as providing a crucial link to students from a range of other disciplines including Engineering, Business, Humanities, Science and Education.

As an employer, you have the opportunity to reach excellent DCU students and graduates through availing of the following:

- Advertising vacancies online, which are seen by up to 1,000 students and graduates per week. Check out: www.dcu.ie/careers
- Participating in an annual Employer Recruitment, which allows companies to meet up to 2,000 talented DCU students and graduates in October every year as well as students from a range of other Irish Universities and Third Level Colleges
- Visiting Employer Programme: To recruit competent, highly-educated DCU students and graduates from relevant courses, you may wish to make presentations on campus or even conduct interviews here. The Careers Service runs a Visiting Employers Program and provides opportunities for companies to come on campus and advertise their vacancies and meet plenty of enthusiastic DCU students
- Opportunity to advertise your vacancies to a range of DCU Alumni in conjunction with DCU Careers Service and DCU Alumni
Raise your company profile on campus: DCU Careers Service can email company information on vacancies of relevance to DCU students and graduates directly into the mail accounts of the appropriate students.

To learn more about how DCU Careers Service can assist you in recruiting high calibre graduates, visit www.dcu.ie/careers or contact Catherine Timmins, Email: careers@dcu.ie, Tel: (01) 7005163.

Alternatively, you may wish to speak to the Careers Advisor responsible for the Computer Applications programme – Denise McMorrow, Tel: (01) 7005847, Email: denise.mcmorrow@dcu.ie.

Or the Head of DCU Careers Service – Muireann Ni Dhuigneain, Tel: (01) 7005162, Email: muireann.nidhuigneain@dcu.ie.

Collaboration on Undergraduate Projects

An interesting way in which companies can raise their profile among graduating students is by putting forward projects which students can work on as part of their course. Companies are also invited to provide in-house support for projects undertaken by students, or to provide financial support for projects assigned to students. There are several benefits to the company, not least of which is the opportunity to get valuable research undertaken that might not be possible within the company due to company commitments. If you are interested in finding out more about possible collaboration with students of the B.Sc. in Computer Applications, contact David Sinclair at Tel: +353 (0)1 7005510 or Email: david.sinclair@computing.dcu.ie.
B.Sc. in Computer Applications: Course Outline

The B.Sc. in Computer Applications is Ireland’s most popular computing degree. It prepares students for a professional career in computing and information technology and gives students an in-depth knowledge of software engineering and information systems and the practical skills to apply this knowledge effectively. Among the topics covered are Artificial Intelligence, Cryptography, Web Design, Multimedia Technology and Computer Graphics – all interesting subjects which are highly relevant in today’s high-tech world.

Programme Structure

The B.Sc. in Computer Applications is delivered over four years on a full-time basis. During the first year students take core introductory software and hardware modules. In subsequent years the students study specialisms in software engineering that will equip them with the necessary skills to create software and to invent new ways of using it.

There is a strong emphasis on practical work in the programme, and this allows students to develop employment-enhancing skills in areas such as team-working and problem-solving. Students spend six months on work placement during third year. This placement, or INTRA programme, integrates academic study with closely related jobs. It gives students an understanding of the professional and practical business world, and helps them to stand out in the graduate employment market.

A brief outline of the content of the degree the graduates have studied:


A full breakdown of modules is available at www.dcu.ie/computing

* It is a requirement to do 4 core subjects and 6 optional
Students complete major projects in both their third and fourth years. Completed individually or in small groups, these projects provide an opportunity for students to put into practice the software development techniques that they have studied in class. This booklet describes projects completed by students on the final year of the degree. An annual display of the students’ work acts as a showcase of their talents to the industrial and business communities. It also allows potential employers to experience the high standard and broad range of the development work carried out by students on the course.

**Career Prospects**

With computing technology playing a growing role in all sectors of society, graduates of the B.Sc. in Computer Applications work as software professionals in a range of industries, from leading edge IT companies to more traditional finance, government and engineering organisations. Graduates have found employment in Ireland and abroad with companies such as AIB, Accenture, BEA Systems, Compaq, Enterprise Ireland, Hewlett Packard, IBM, Intel, Irish Life, Microsoft, O2, RTE, Sun Microsystems and Xilinx. In addition, many are heading up their own companies designing new products while others have pursued further studies leading to careers in research.

The programme enables access to postgraduate study in a large variety of interesting fields, including innovative courses in Bioinformatics, Security & Forensic Computing, Electronic Commerce, Software Engineering and Business Informatics offered by DCU.

**Further Information**

Detailed information on this course, including information on modules offered, is available at www.dcu.ie/computing. The School of Computing has prepared a DVD, IT4U, which gives students a real insight into what it’s really like to study computing at third level. It describes the range of employment opportunities available to graduates, while interviews with current students, recent graduates, academics and industry experts will tell you all you need to know about life as a computing student and the exciting career paths which graduates can follow. To request a copy of this DVD, email Christine Stears at christine.stears@computing.dcu.ie or Tel: +353 (0) 1 7005237.

**View Computer Applications Projects at DCU Open Day**

DCU Open Day takes place each year on the third weekend in November, over two days, Friday/Saturday. Talks on each of the University’s undergraduate degrees are held throughout both days, and prospective students can meet with lecturers, current students and recent graduates. At the School of Computing, visitors have the opportunity to view some of the projects completed by the previous year’s Computer Applications students. You can also see some of the interesting research projects at Open Day 2010.
B.Sc. in Enterprise Computing: Course Outline

Computing technology has penetrated every corner of the commercial and industrial world and is a key enabler in driving business innovation. It is the backbone of many organisations such as online banking, e-commerce and online auctions.

The expertise needed to deploy technology solutions at the business front line involves an understanding of both technological possibilities and business needs.

The B.Sc. in Enterprise Computing produces graduates trained to meet this need, giving them the foundation for a career combining IT management and business.

Three Main Subject Areas:

Computing, Business and I.T. Management

Computing: Computing subjects build technical knowledge and practical skills that are the core of IT operations.

Computing subjects include:

- Computing hardware, operating systems and application processes
- Web technology
- Computer networks
- Software systems and programming
- Databases and I.T. architecture and its management

These areas coupled with practical experience provide graduates with the ability to perform in a business IT setting. They help students to develop problem-solving, communication and learning skills needed for a rewarding career as an IT professional.

Business: Graduates will learn how organisations operate both internally and as part of a broader business ecosystem. Understanding business needs will mean graduates develop an awareness of the potential for IT to contribute to business effectiveness and profitability.

Business subjects include:

- Understanding organisations and the principles, concepts and techniques for managing them
- Running of a business, how the functions of a business integrate, and the role and importance of business strategy
- Financial reporting and statements
- Modern production and operations development
- Marketing
Business subjects provide graduates with an understanding of business that prepares them for a career in the application of IT within business, industry and government.

**I.T. MANAGEMENT:** Graduates will acquire good personal and team skills that enable them to understand the needs of a range of business personnel, and to be able to work with both business and technically-orientated personnel in devising technical solutions to business problems and in smoothly integrating technology into business processes.

- Knowledge and skills for successful project management
- Information safety and security
- IT service management and international standards
- Legal and ethical issues in IT
- Organisational change and change management
- Understanding of key digital technologies and their potential
- Outsourcing and software procurement and supplier management
- Design, construction and maintenance of large enterprise IT systems

Graduates will be able to think creatively as to how best to use technology in finding new efficiencies and new business opportunities, and to head up and manage teams that drive business transformations.

**Strong Practical Focus**

Practical experience is a major component of the student’s learning. Years one, two and four consist of formal lectures but with practical applications in the computer labs and tutorials and on-going assessments and projects drawn from real world situations.

Most of year three is devoted to paid work placement through DCU’s INTRA programme. Students are prepared for this work placement through their modules in year two, and especially through Business Communication Skills. The course includes elements of report writing, business communications and office practice.

The students will also be expected to develop project ideas related to the business, and pursue those ideas in the student’s final year project. Student learning is directed, supported, has specific outcomes, includes strong practical work experience and prepares them for a career.

Students gain an understanding of the professional and practical business world, and making them stand out in the graduate employment market.
**Broad Career Opportunities**

Computer technology continues to play an important role in all sectors of society. Graduates of the B.Sc. in Enterprise Computing are equipped to work as I.T. managers and professionals in a range of industries, from I.T. specific companies to more traditional finance, government and indeed, any organisation that has a need for technology management.

Some graduates will opt to set up their own companies while others may wish to pursue further studies. Graduates will also have great opportunities to travel and work abroad due to the fact that hardware, software and programming techniques used in computing are the same the world over.

**Course Structure**

The table below is indicative of how the programme is structured over the four years.

As with the strong emphasis on practical work, there is also a focus on transferable skills such as communication skills, teamwork, analytical skills, critical thinking and problem-solving skills, resource management, ethical awareness and research skills.

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<tr>
<th>YEAR ONE</th>
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<td>Web Design and Programming</td>
<td>Developing Internet Applications</td>
<td>“INTRA” paid work placement programme</td>
<td>Project Management</td>
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<tr>
<td>Introduction to Computer Hardware</td>
<td>Business Database Management</td>
<td>Security Management</td>
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<tr>
<td>Programming and Operating Systems</td>
<td>Software Testing</td>
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<td>Financial Statement Analysis</td>
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<td>Management and business game</td>
<td>Organisational Information Systems</td>
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<td>Team Project</td>
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<td>Marketing</td>
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For full list and details of modules please see: [www.dcu.ie/computing](http://www.dcu.ie/computing)

If you have any queries or require further information on this programme, you can contact us directly at (01) 700 5237 or marketing@computing.dcu.ie and we’ll be happy to answer any questions you might have.
About DCU School of Computing

The School of Computing at Dublin City University has earned a strong reputation for excellence in research and teaching. In addition to its flagship B.Sc. in Computer Applications degree and its newly launched B.Sc. in Enterprise Computing, the School offers a range of innovative taught programmes aimed at producing graduates with the professional and personal skills most sought after in the Information Economy. The School also enjoys a lively, supportive environment for research in many areas of computing, with its numerous Ph.D. and M.Sc. research students producing work of significance at both national and international level.

With close industry links and fee support for EU students, the School's teaching and research programmes reflect the current and anticipated needs of Ireland's industrial and commercial sectors while at the same time meeting the most rigorous national and international academic standards. The emphasis on relevance and flexibility continues to attract large numbers of high-calibre students from throughout Ireland and abroad and to ensure strong demand for DCU graduates in the workplace. Employment statistics for DCU graduates show they fare consistently well above the national average for graduates from all third-level institutions combined.

Postgraduate Taught Programmes

The following programmes are all delivered on a one-year full-time basis, and there are also programmes available on a part-time basis:

- M.Sc. in Security & Forensic Computing (One year full-time/Two years part-time)
- M.Sc. in Software Engineering (One year full-time/Two years part-time)
- European M.Sc. in Business Informatics (One year full-time/Two years part-time)
- M.Sc. in E-Commerce (Technical or Business)
- M.Sc. in Bioinformatics (Computing or Life Sciences)
- Graduate Diploma in Information Technology (One year full-time/Two years part-time)

All taught postgraduate programmes in DCU School of Computing are financially supported by the Higher Education Authority Skills Initiative. This means that most European Union Students pay only a small portion of the annual fee, amounting to approximately €2,000 (based on fees for 2009/10).

Further information on programmes offered by DCU School of Computing, is available at www.dcu.ie/computing. Programme enquiries should be directed to graduatestudy@computing.dcu.ie or Tel: +353 (0)1 7005237. To apply for a taught postgraduate programme, visit the Postgraduate Applications Centre (PAC) at www.pac.ie to complete an online application. For closing dates, see our website.
M.Sc. in Security & Forensic Computing

PAC Code: DC823 (Full-time) DC822 (Part-time)
Please email marketing@computing.dcu.ie for details on part-time application

A one-year full-time/ two-year part-time Masters programme which teaches the practical investigation of computer crime and the principles underlying computer security.

Programme Overview

In recent years, technologically competent criminals have been increasingly exploiting the use of new technologies in the commission of crime. The investigation of such crime has led to the emergence of a new field of specialisation termed “forensic computing”, which involves the detection, storage, analysis and exhibition of digital evidence in a legally admissible manner. DCU’s M.Sc. in Security and Forensic Computing equips graduates to carry out this sophisticated technical work, while also exploring effective methods which may be used to assist in the prevention of such crime. With excellent graduate employment prospects and major fee support for EU students, DCU was the first university in Ireland to offer an open-entry taught M.Sc. programme in this expanding area.

Forensic Computing: A Truly Multidisciplinary Science

Forensic Computing is often regarded as a primarily computer-related problem with technical solutions. In reality, however, Forensic Computing draws on a number of disciplines: namely, computer science, information systems, law, and social science. Accordingly, the M.Sc. in Security and Forensic Computing adopts a holistic approach to the study of Forensic Computing, and provides students with an understanding of the legal, technical, information management and ethical issues impacting on the discipline. Hence, graduates are thoroughly prepared to undertake their work in a structured manner consistent with evidential requirements.

Blend of the Theoretical with the Practical

Delivered on a full-time basis over one calendar year and a part-time basis over two years, the uniqueness of this Masters degree lies in its blending of the practical commercial examination of Forensic Computing with the theoretical study of security and cryptography in the prevention of digital crime. Interactive learning methods – including laboratory work, presentations, seminars and guest lectures – are employed so that students learn to evaluate theoretical material and effectively apply it to practical assignments. By so doing, participants also develop vital professional and interpersonal skills in such areas as teamwork, communication, research and critical thinking.
Industry-Relevant Assignments

During the final semester, from May to August, students draw on knowledge gained over the first two semesters to work on a practicum, or major project of a practical nature. Here, the students, individually or in small teams, develop prototype secure software systems to solve a real-world problem or, alternatively, analyse forensic approaches and propose improvements. The projects, which may be provided by external clients or involve some of the students’ or staff’s own ideas, typically require the preparation of a feasibility study, followed by creation of a project plan and development of a software application or rigorous theoretical analysis. Importantly, this practicum element allows students, where applicable, to work on in-house problems for their respective sponsoring organisations.

Broad Employment Prospects

The programme offers strong employment prospects for graduates in the growing areas of security consultancy, secure software development, and forensic computing itself. The skills developed in graduates are particularly attractive to software consultancies, financial institutions, law enforcement agencies, and software security houses, and all for whom security is of paramount strategic importance. Among the firms for which graduates currently work are KPMG, Deloitte, Price Waterhouse Coopers, Ericsson, Fidelity, Daon, IBM, Microsoft, Symantec and Ernst & Young.

Indicative Programme Structure

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<td>Cryptography &amp; Number Theory</td>
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<td>System Software</td>
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<td>Secure Programming</td>
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<td>Professional &amp; Research Practice</td>
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<th>SEMESTER 2</th>
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<td>February to April</td>
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<td>Public Key and Security Protocols</td>
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<td>Biometrics</td>
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<td>Network Security</td>
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<td>Forensic Computing</td>
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| SUMMER | PRACTICUM |

Entry Requirements

Applications are invited from candidates who have, at a minimum, a good Second Class Honours degree in Computer Science, Computing, Computer Applications, or a discipline with a strong computing content. Applications are also welcome from Honours graduates of other disciplines who have significant experience in the security or software development sectors.
M.Sc. in Software Engineering

PAC Code: DC824 (Full-time)
Please email marketing@computing.dcu.ie for details on part-time application

A one-year full-time/ two-year part-time programme that equips software engineering professionals with the cutting-edge skills to produce high quality software and systems.

Programme Overview

The one-year full-time M.Sc. in Software Engineering in School of Computing has been consistently popular with post-graduate students. It can also be studied part-time over two years. The programme equips software engineers with the cutting-edge skills to produce high quality software and systems that deliver value to business and the economy. Course participants will be exposed to the latest ideas and best practices in industry. They will develop their analytical, creative and critical faculties and acquire new techniques, methods and ideas. Students will also develop an awareness of the professional responsibilities associated with being a member of the software engineering profession. Graduates will therefore be fully equipped to advance their career in a fast-changing industry.

Broad Career Opportunities

The M.Sc. in Software Engineering will help meet the demand of industry for personnel who have had significant exposure to advanced topics in the field. It is suitable for experienced professionals and recent graduates alike. Software professionals with a number of years’ experience will improve their proficiency across a range of key disciplines in the field, and update their skills beyond the narrow remit of training courses. The programme will support recent graduates of computing and cognate disciplines by giving them unrivalled knowledge and skills well above the norm for new industry entrants. Thus, it will help software engineers to advance their careers whatever their level of experience.

Course Outline

The M.Sc. in Software Engineering is offered on both a full-time and part-time basis. The full-time programme is delivered in one calendar year of full-time study. It consists of two taught semesters followed by a practical project, referred to as a practicum, completed between May and September. The part-time option has exactly the same content but it consists of four taught semesters, followed by the practicum.

During the taught semesters, students undertake an integrated group of taught modules in advanced software engineering. These modules will enable participants to use the latest methods to design and implement software systems across multiple complex distributed software platforms. Students will also learn up-to-date programming and specification techniques, formal and informal, theoretical and practical. In addition, participants will be introduced to the professional issues surrounding the development and implementation of software systems. They will be well prepared to undertake their work within defined software processes using the best techniques currently available.
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**Strong Practical Focus**

The programme has a strong practical focus, culminating in the practicum over the summer months. Here, students will typically develop prototype software systems that solve a real-world problem. They may also analyse software engineering techniques, processes or methods, and propose and evaluate alternatives. Most practicums will be carried out in small teams, although individual projects may be possible. Students may be sponsored by external clients or develop some of their own ideas. Typically they will begin with a feasibility study followed by the creation of a project plan, and the development of a software application or a rigorous theoretical analysis. The practicum is written up in the form of a dissertation.

**Focus on Industry-Relevant Skills Development**

The M.Sc. in Software Engineering will allow students to develop employment-enhancing skills across a number of key areas. Their ability to engineer software will be enhanced considerably, as will their knowledge of operating systems and networks. Communication skills will be enhanced by exercises in presenting work to lecturers and peers. Students’ view of the profession will be enriched, and they will understand the business and social context of their work. Importantly, graduates will also develop research skills that will enable them to investigate new ideas, methods and tools as they arise in their professional careers.

**Entry Requirements**

Candidates must hold at least a Second Class Honours degree in Computer Science, Computing, Computer Applications or a related discipline. Candidates with significant experience in the software development sectors, in addition to an Honours primary degree in some other discipline, may also be considered for entry.

**Indicative Full-time Programme Structure**

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<tr>
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<th><strong>SEMESTER 2</strong></th>
<th><strong>SUMMER</strong></th>
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<tr>
<td><em>(October to December)</em></td>
<td><em>(February to April)</em></td>
<td>PRACTICUM &amp; DISSERTATION</td>
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<tr>
<td>Research/Professional Skills</td>
<td>Service-Oriented Architecture</td>
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<tr>
<td>Secure Programming</td>
<td>Concurrent Programming</td>
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<tr>
<td>Systems Software</td>
<td>Formal Programming</td>
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<tr>
<td>Information System Architecture</td>
<td>Software Process Quality</td>
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European M.Sc. in Business Informatics

PAC Codes: September Intake: DC825 (Full-Time) DC699 (Part-Time)

A step ahead with Computing

A one-year full-time/two year part-time Masters programme that equips graduates or professionals of computing and software engineering with a deep understanding and modelling of business information systems, with an international perspective.

Programme Overview

Information and communications technology (ICT) has become increasingly important for 21st century organisations. It underlies many social and economic innovations and activities that offer companies new strategic options. However many organisations have difficulties developing technological solutions into usable and effective information systems. They need professional analysts who can both understand and use the technology, and analyse and model the operations of the business.

To meet these challenges graduates must be able to solve business problems and analyse underlying organisational processes, as well as understanding their wider social, economic and cultural implications. This is the core field of interest of the European M.Sc. in Business Informatics. Students on this course will learn how to analyse business requirements, to develop information system architectures and to design business processes and IT solutions.

Career Opportunities

The international focus of the European M.Sc. in Business Informatics will make graduates particularly sought-after in the global ICT marketplace. Graduates can be expected to be recruited to a wide range of positions such as information system consultant, information manager, business process analyst or IT manager. Employing companies will include those heavily dependent on ICT, and companies with international operations, such as financial services firms, healthcare, logistics, public service enterprises or multinational corporations.

Four Months in a European Environment: A unique opportunity

The European M.Sc. in Business Informatics is designed to be completed in one calendar year of full-time study or over two years part-time. In the final four months of the programme students will have an opportunity to work on a research project and gain work experience in a European country, supervised at one of our partner universities. Projects may be sponsored by external organisations or involve some of the students’ or staff’s own ideas.
Intended Audience

Participants enrolling in the European M.Sc. in Business Informatics come from different countries and have achieved a primary degree in Computing, Computer Science or Software Engineering. Some candidates might come from a comparable discipline or have a degree in a Science or Engineering discipline and have worked or studied for several years in software development.

Our part-time option, is aimed at professionals who want to enhance their career progression within the industry.

Indicative Programme Structure (Full-time)

<table>
<thead>
<tr>
<th>SEMESTER 1</th>
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<tr>
<td>(October to December)</td>
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<tr>
<td>Professional &amp; Research Practice</td>
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<tr>
<td>Information Systems Architecture</td>
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<tr>
<td>Management &amp; Information Technology</td>
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<tr>
<td>Data Analysis</td>
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<tr>
<th>SEMESTER 2</th>
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<tbody>
<tr>
<td>(February to April)</td>
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<tr>
<td>Managing &amp; Working in an Intercultural Environment</td>
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<tr>
<td>Supply Chain Management</td>
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<tr>
<td>Managing Projects and Change</td>
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<tr>
<th>Options</th>
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<tbody>
<tr>
<td>HCl and the Web</td>
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<tr>
<td>Service-Oriented Architectures</td>
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<tr>
<td>Software Process Quality</td>
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<tr>
<td>eCommerce Infrastructure</td>
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<th>SUMMER</th>
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<tr>
<td>PRACTICUM &amp; DISSERTATION</td>
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Entry Requirements

Minimum Upper Second Class Honours degree, or equivalent, in Computer Science, Computing, Computer Applications, or a Science or Engineering degree with a significant IT component. Applicants should have a strong technical background in software development. Applicants from other disciplines with significant technical experience in IT will also be considered.
M.Sc. in Electronic Commerce (Technical and Business Streams)

(PAC Code: DC821 & DC506)

A one-year full-time Masters programme featuring a common core curriculum with two distinct streams, Business and Technical.

Programme Overview

Companies of all sizes and backgrounds are continually finding innovative applications for e-commerce, with new ways to develop, promote, advertise, distribute, sell and source products and services of all kinds. One of the key features of e-business, from a skills perspective, is that it predominantly requires professionals with a mix of different skill types. This Masters programme, which is jointly offered by DCU’s School of Computing and DCU Business School, is designed to produce graduates with the multi-faceted skills required to operate successfully in this exciting and dynamic industry. With major fee support for EU students and a strong practical focus, the programme has a wealth of attractive features for both recent graduates and those wishing to update their skills through full-time study.

Two Streams: Business or Technical

The uniqueness of this Masters degree lies in the interaction fostered between participants on its Technical and Business streams. Its specially-designed structure sees students of both streams following a common core curriculum, along with a number of modules particular to their stream (See Programme Structure). Over two taught semesters, participants on the Business stream take modules in advanced business topics, as well as some fundamental modules in computing. Simultaneously, students on the Technical stream take advanced computing courses, along with foundation modules in business topics. Hence, this curriculum allows participants to gain a solid grounding in both the technical and strategic issues relating to e-commerce.
Innovative Learning Methods

DCU’s M.Sc. in Electronic Commerce really is a degree for life. Not only do students gain an in-depth knowledge of e-commerce, its workings and its many applications, but the programme’s strong emphasis on practical assessment also means that students can hone vital transferable skills in areas such as interdisciplinary communication, presentation, organisation and team-working. This is achieved primarily through the use of innovative learning methods, including case studies, seminars and presentations, which serve to facilitate integration of the theoretical and practical aspects of the programme. The use of guest speakers is also an important element of the course, as they help bring an industry perspective. Guest speakers include representatives from Amárach Consulting, DMR Consulting, Ericsson, IBM, Siemens and SmartForce, Google and Red Hot.

Strong Practical Focus

The programme is very firmly grounded in the reality of the Information Age, and this fact is evidenced nowhere more so than in the practicum, or major project of a practical nature. Running from May to August, the practicum sees students of both streams combining to build a prototype e-commerce system that solves a real-world problem or exploits a real-world opportunity. The projects, which may be provided by corporate clients or involve some of the students’ own ideas, typically involve market research, formulation of project and business plans, and design and development of a working e-commerce system prototype.

Thus, the practicum represents one of the most challenging, yet rewarding aspects of the programme, and gives students the opportunity to hone the skills they have developed over the first two taught semesters.

Broad Employment Prospects

The unique mix of skills acquired by students over the course of the programme makes them highly employable. This is true, not solely in relation to high-tech sector jobs, but also for more traditional industries where graduates can develop innovative new systems and processes to enable firms to meet the challenges of the New Economy. As a result, graduates have undertaken a variety of careers in Ireland and abroad as software developers, Web authors, business analysts, e-marketing specialists, and e-business technologists, with such companies as Accenture, Ariba Technologies, Daimler Chrysler, Danone, Deloitte, e-Spatial Solutions, IBM, Microsoft, Mars UK, and JP Morgan, Ernst & Young and Chase Manhattan Bank. Graduates have also gone on to set up their own successful start-up businesses.
Indicative Programme Structure

<table>
<thead>
<tr>
<th></th>
<th>Technical Stream</th>
<th>Common Modules</th>
<th>Business Stream</th>
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<tbody>
<tr>
<td><strong>SEMESTER 1</strong></td>
<td>■ Cryptography &amp; Number Theory *</td>
<td>■ HCI and the Web</td>
<td>■ Organisation &amp; Management in the Networked Era</td>
</tr>
<tr>
<td></td>
<td>■ Systems Software *</td>
<td>■ Marketing in a High-Tech environment</td>
<td>■ The Digital Economy</td>
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<td></td>
<td></td>
<td>■ Business Modelling &amp; Process Innovation</td>
<td>■ Object Oriented Programming ***</td>
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<td>■ Finance ***</td>
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<td></td>
<td>■ Object Oriented Programming ***</td>
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<td></td>
<td>■ Finance ***</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SEMESTER 2</strong></td>
<td>■ Public Key Cryptography and Security Protocols*</td>
<td>■ E-Commerce Infrastructure</td>
<td>■ Strategic Thinking in the Information Age</td>
</tr>
<tr>
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<td>■ Information Access**</td>
<td>■ Networks &amp; Internets ***</td>
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<td></td>
<td></td>
<td>■ E-Commerce &amp; Entrepreneurship</td>
<td>■ Human Resource Management***</td>
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<tr>
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<td></td>
<td>■ Risk Management &amp; Regulation in E-Commerce</td>
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<tr>
<td><strong>SUMMER</strong></td>
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<td>PRACTICUM</td>
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* These extended modules worth 1.5 times other modules.

** This module has two modes. One mode for technical students worth 1.5 modules; the second mode is a shorter module worth 1 module for business students.

*** One module selected from two per semester, depending on original undergraduate degree background (computing or business).

Entry Requirements

Technical Stream: Minimum Second Class Honours degree in Computer Science, Computing, Computer Applications or a related discipline. Candidates with significant industry experience in the electronic commerce/software development sectors, in addition to a primary degree in some other discipline, may also apply for entry.

Business Stream: A First or Upper Second-Class Honours degree in Business, Computing or a related discipline; or Candidates with significant business experience on top of a primary degree. In exceptional circumstances, candidates with a lower second class honours degree may be admitted.
M.Sc. in Bioinformatics (Computing or Life Sciences)

(PAC Code: DC702)

A one-year full-time Masters programme featuring a common core curriculum with two distinct streams, Computational Systems Biology and Bioinformatics for Life Sciences

Programme Overview

Jointly offered by DCU’s School of Computing and School of Biotechnology, Biology Department of NUIM and Teagasc, this Masters programme is designed to produce graduates with the inter-disciplinary skills required to prosper in the expanding bioinformatics and systems biology sectors. With an industry-oriented focus, state-of-the-art facilities, and major fee support for EU citizens, DCU’s M.Sc. in Bioinformatics has at its core the integration of the life science and computing aspects of this exciting new discipline.

Two Streams: Computational Systems Biology and Bioinformatics for Life Sciences

The two streams within this programme are designed to offer two distinct tracks with a shared bioinformatics emphasis to appeal to both computing and life science specialists. The innovative programme structure sees students of both streams following common core curriculum, along with a number of modules particular to their stream. Over the first semester students on the Bioinformatics for Life Sciences stream take a module in computer programming for life scientists, while simultaneously, students on the Computational Systems Biology stream take a module in genetics and life sciences for computer scientists. This educational process therefore fosters the creation of synergy between the two streams, and allows students to gain a grounding in both the computing and life science aspects of the bioinformatics industry.

Emphasis on Industry-Relevant Skills

DCU’s M.Sc. in Bioinformatics has been developed with desirable skills for industry bodies in mind in order to maximise its relevance to industry needs. Accordingly, modules are delivered using a variety of interactive learning methods - including seminars, presentations, guest lectures, problem solving and research projects - all of which are designed to facilitate integration of the theoretical and practical aspects of the programme. Additionally, the course’s unique structure strongly fosters interaction between participants on the two streams, thereby allowing them to develop vital industry-relevant skills in the areas of interdisciplinary team working, learning and communication.
A Blend of the Theoretical with the Practical

One of the most challenging, yet rewarding elements of the programme is the practicum. Running from May to August, this sees students from both streams working on a major research project with a systems biology/bioinformatics focus. Here, the multi-skilled teams of students draw on theoretical knowledge gained over the taught element of the programme to develop integrated solutions to computational/life sciences problems. The projects may be inspired by student interest, staff research or industry clients, and will typically involve research and development of a software application, bioinformatic analyses, or extension of standard computational and bioinformatic techniques.

A number of past projects have given rise to published papers in academic journals. In exceptional circumstances, there is an option available for students who are unable to undertake the practicum to obtain the qualification of Graduate Diploma in Bioinformatics.

Bioinformatics: An Exciting Career Option

Currently there is a worldwide shortage of professionals with the computing and life science skills necessary to support the growing bioinformatics and biotechnological industries. With recent advances in genomic sequencing (Next Generation Sequencing), and the entire field of genetics moving to large scale studies, these skills will be highly desirable for the foreseeable future. Hence, for individuals who enjoy being at the forefront of scientific developments, bioinformatics can be a very rewarding career option. With increased research supports for genomics, there is a growing demand for researchers and managers, among others, with a thorough understanding of the techniques used in genome analyses. Bioinformatics graduates are also in strong demand in other sectors such as the chemical industry, where they can aid product development, and the pharmaceutical industry, where they can assist in developing superior drugs. Among the companies and institutions for which our graduates work are ArraDx, Beaumont Hospital, Dublin City University Research Institutes, European Bioinformatics Institute (EBI), European Molecular Biology Lab (EMBL HeidleBerg), Ericsson, Icon Clinical Research, Quintiles, and the Royal College of Surgeons in Ireland.
MSc Bioinformatics

SEMESTER 1

**Life Science Stream**
- BIXXX: Perl Scripting and Unix Pipelines for Bioinformatics (7.5)
- CA660: Data Analysis (7.5)
- CA640: Professional and research practice (7.5)
- BE524: Analysis in Pharmacology and Immunology (7.5)

**Computing Stream**
- BE541: Genomes, Genes, Evolution and Heredity (7.5)
- CA660: Data Analysis (7.5)
- CA640: Professional and research practice (7.5)
- BE524: Analysis in Pharmacology and Immunology (7.5)

SEMESTER 2

- BET501: Sequencing and Systems Biology (7.5)
- BE542: Comparative Genomics and Phylogenomics (7.5)
- CA659: Math modelling/computational science (7.5)
- CA658: Biocomputing (7.5)

SEMESTER 3

Research project: individual student research projects.
Placed in participating laboratory in any of the 3 institutes.

BI = NUIM
BET = Teagasc
BE/CA = DCU

Total credits = 90
Graduate Diploma in Information Technology

PAC CODES:

DC818  Full-Time September intake
DC819  Part-Time September intake
DC845  ICT Professional Entry Part-Time September intake
DC846  ICT Professional Entry Full-Time September intake

A one-year full-time/two-year part-time skills conversion programme for graduates of non-computing disciplines and non-graduates with relevant industrial experience

Programme Overview

The Graduate Diploma in Information Technology is an in-depth skills conversion course aimed at those who wish to pursue a career in the Information Technology field but whose primary qualification lies in an area outside IT. It attracts graduates from a wide range of disciplines, including the arts, engineering, education and science, and provides students with an excellent grounding in IT and its related disciplines. It is also open to professionals with relevant industrial experience who are looking to up-skill, gain a qualification in this area and progress in their career. Alongside excellent employment prospects, the course also offers major funding support to EU students, and a strong practical focus aimed at developing graduates with the kind of personal and professional skills most sought after in the Information Economy.

Flexible Study Options: Full-time or Part-time Delivery

The Graduate Diploma in IT is offered on both a full-time and part-time basis, making it suitable for both recent graduates wishing to broaden their skills portfolio, and individuals already in full-time employment, who are seeking to obtain a recognised qualification in the IT area. The full-time programme is delivered in one academic year, with eight taught modules offered over two semesters:

<table>
<thead>
<tr>
<th>SEMESTER 1</th>
<th>SEMESTER 2</th>
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<tbody>
<tr>
<td>Object Oriented Programming</td>
<td>Advanced Programming</td>
</tr>
<tr>
<td>HCI and the Web</td>
<td>System and User Interaction Development</td>
</tr>
<tr>
<td>Database Design</td>
<td>Introduction to Networks and OP systems</td>
</tr>
<tr>
<td>Information Systems Framework</td>
<td>E-Commerce Infrastructure</td>
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</table>

The part-time programme has exactly the same content as the full-time version, except that it is presented over two academic years. Part-time students attend DCU for 2 nights per week.
Practical, Industry-oriented Focus

Developed in close collaboration with industry, the Graduate Diploma in Information Technology aims not only to develop students’ understanding of the conceptual underpinnings of IT, but also to enhance their transferable skills in areas such as research, problem solving, critical thinking, and independent learning. Accordingly, a strong emphasis is placed on practical assessment, with innovative, interactive learning methods designed to facilitate integration of the theoretical and practical aspects of the programme. This focus on personal and professional development heightens the attractiveness of graduates to prospective employers, as it helps to ensure that they are ideally suited to meet practical industry needs.

Graduate Employment

The blend of skills developed in graduates makes them suitable for jobs wherever computing technology is employed, and that is in every sector of the economy. As a result, graduates of the programme have gone on to pursue a wide variety of careers in Ireland and abroad in areas such as software design and development, teaching, IT consultancy, sales, computer support, and business analysis. Among the firms for which they work are AC Nielsen, Bank of Ireland, Citibank, Deloitte & Touche, Ericsson, IBM, JP Morgan, Lucent Technologies, Merrill Lynch, and SAP.

Entry Requirements

Graduate applicants to the programme must have, at a minimum, a Second Class Honours degree in a non-computing discipline, or an equivalent qualification.

Non-graduate applicants (ICT Professional Entry) need to have the relevant industrial experience. See website for further details.
DCU School of Computing enjoys a vibrant research community. It currently has over one hundred postgraduate research students and a wide range of funded projects at national and international level. The School houses the Centre for Next Generation Localisation (CGNL) and Clarity – Two large scale CSETS funded by SFI, part of the Centre for Digital Video Processing (CDVP), the National Centre for Language Technology (NCLT), and the Biocomputation arm of the National Institute of Cellular Biotechnology (NICB), the NDRC in Scientific Computing and Complex Systems Modelling (SciSym) and the interoperable Systems Group (ISG).

Research is funded by national and international agencies including Science Foundation Ireland; Enterprise Ireland; the Higher Education Authority; the Irish Research Council for Science, Engineering and Technology; Teagasc; Bord lascaigh Mhara; the Department of Education and Science; and the E.U. Sixth Framework Programme.

The School enjoys close links with industry, and this is evidenced in the significant number of research collaborations it has forged with companies such as IBM, Sun Microsystems, Xerox, Mitsubishi Electric Research Labs and Ericsson.

Each year a significant number of research scholarships are available to outstanding graduates interested in working towards a Ph.D. Prospective students are advised to visit our website at www.dcu.ie/computing/research for further details.

Research in the School of Computing is classified into four groups:

1/ Language and Intelligence

The Language and Intelligence group is primarily involved in research into and development of applications in two main areas:


- Artificial Intelligence, including Artificial Minds, Computational Models of Cognition, Knowledge Representation, Human-Computer Interaction, Cognitive Science, The Origins of Intelligence, Neural Networks and Autonomous Agents.

The group takes active part in the National Centre for Language Technology’s weekly seminar series in DCU, and co-hosts the Dublin Computational Linguistics Seminar series.

For further information, visit: http://www.computing.dcu.ie/research/language.html

The National Centre for Language Technology (NCLT)

Language is the key modality in human communication. A rapidly growing volume of valuable information is encoded in text available on the world-wide-web and the electronic data repositories of large business, governmental, educational, health and entertainment organisations. In order to quickly
and reliably access information across language barriers, language technologies are required. Translations need to be made available ever more quickly and for ever more languages. This growth in translation demand is rapidly outstripping translators’ supply. The only solution is to develop Machine Translation (MT) systems capable of accurately translating large volumes of text 24 hours a day. Aside from MT, language technologies have the potential to improve human-computer interaction in many other ways: building more intelligent search engines, granting access to information on the move using spoken language, unimpeded by keyboard- or screen-based interface devices, and providing intelligent, multi-modal, language-learning environments.

The National Centre for Language Technology conducts basic research into the processing of human language by computers, including machine translation, grammar induction, statistical parsing and generation, grammar checking, computer-aided language learning, speech recognition and synthesis, question answering and information retrieval. The NCLT also develops applications and has produced groundbreaking technologies in Machine Translation (including the translation into Sign Language) and the automatic acquisition of wide-coverage grammatical resources.

NCLT Director: Dr. Jennifer Foster, +353 (0)1 700 5263, jfoster@computing.dcu.ie

The Centre for Next Generation Localisation (CNGL)

Localization is the industrial process of adapting digital content to culture, locale and linguistic environment, at high volume, speed and quality and low cost. It is a core value-adding and multiplier component in today’s global business operations, and opens up new markets to software, services and goods. There are currently three challenges facing the localisation industry. Volume: the amount of material that needs to be translated into an ever increasing number of languages; Access: the modalities in which information is accessed; Personalisation: making information relevant to the user (or user group) at a level of granularity more fined-grained than that provided by traditional localisation.

Because of the importance of the localisation industry in the Irish ICT industry, the Science Foundation Ireland (SFI) has funded a Research Centre for Next Generation Localisation (CNGL 2007-2012). The objective of the research centre is to develop solutions to the problems of Volume, Access and Personalisation, facing the localisation industry. Volume and access are addressed through sophisticated language and speech technologies (centred on MT) and personalisation through novel digital content management technologies from Adaptive Hypermedia and Information Extraction/Retrieval. The CNGL project will integrate these technologies into Localisation Workflows in the Next Generation Localisation Factory and produce demonstrator systems. The Centre is an Industry-Academia Partnership led by Dublin City University, and involves Trinity College Dublin, University College Dublin and the University of Limerick as academic and IBM, Microsoft, Symantec, Dai Nippon Printing, SDL, VistaTec, Alchemy, Traslan and SpeechStorm as Industry partners, with a total of approx. 100 researchers, Post-Docs, PhD students and support staff across the participating sites over the 5 years. Total funding is 33M euro.

CSET Director: Prof. Josef van Genabith, +353 (0)1 700 5074, josef@computing.dcu.ie
Between them, the NCLT and the CNGL host an international research team including 30+ PhD students, 12 postdoctoral researchers and 12 affiliated staff. The NCLT currently holds 2 SFI-funded Principal Investigator grants, 1 Basic Research grant, 1 Enterprise Ireland Commercialisation Grant and several IRCSET PhD grants. The NCLT works in close partnership with SFI, EI, IRCSET, ICHEC and industrial (including IBM, Microsoft, Xerox PARC, Toshiba China) and academic partners worldwide.

**Example Project 1 - Attempt: “All Trees” Efficient Models of Parsing and Translation**

Current statistical approaches to Machine Translation often produce ‘word salad’. Despite the fact that knowledge of syntax has been shown to be useful in other MT paradigms, no one has successfully incorporated such models into today’s leading SMT systems. Example-based models currently achieve state-of-the-art performance in both parsing and translation, but computational efficiency can be a problem. This project proposes a number of efficient approaches to the problem of Translation by Parsing using all training examples (“all trees”), focusing in the first instance on the underlying monolingual parsing models and scaling them in subsequent phases to the bilingual case.

**Example Project 2 - Syntax-Based MT Evaluation**

The Syntax-Based MT Evaluation project centres around developing an MT automatic evaluation method based on LFG dependency triples, which describe the internal structure of the sentence and not only its surface form. This will allow the comparison of the translation with the reference text on the structural level, and, coupled with a lexical and low-level syntactic paraphrasing, is likely to provide a more accurate MT quality evaluation than the current, string-based techniques.

**Example Project 3 - Statistical Parsing and Generation for Intelligent Search**

The project aim is to produce a natural language parser and generator to be used as part of an intelligent search engine or a question-answering system. The parser is a syntactic analyser which takes as input a sentence and produces as output a data structure which represents the syntactic structure of the sentence including the relationships between all the words in the sentence. When used as part of a search engine, the parser can be used to analyse both the search query and the documents to be searched so that an insightful matching between the two can be carried out and highly relevant results returned. The generator accepts as input the data structure produced by the parser and produces a natural language sentence. It can be used to return search results in the form of a natural language statement rather than a list of documents.
2/ Dependable Systems Group Research Group

The Dependable Systems Group has three major themes: Software Engineering, Formal Methods and Security. The research conducted in this group is broad, dynamic and multi-faceted, and can vary from highly theoretical, abstract models, through the development of numerous branches of technology, into empirical studies of industrial practice.

The focus of the Dependable Systems Group is the development of reliable and secure software. This encompasses a number of different approaches to ensuring the dependability of software, from the softer approaches through software development methods and software project management, to more formal approaches through refinement, verification and automatic program construction.

Several researchers from the Dependable Systems Group are also affiliated with Lero – The Irish Software Engineering Research Centre.

Example Project 1 – Secure Mobile Code

One of the main issues facing the deployment and acceptance of mobile and distributed systems is security. Proof-carrying code is a promising technique to ensure the safety of mobile code, but it remains to be seen whether it will scale up to more sophisticated security policies. The key idea behind proof-carrying code is that the code producer is required to create a formal safety proof that shows that the code respects the defined safety policy. Then, the code consumer is able to use a simple and fast proof validator to check with certainty that the proof is valid and hence the foreign code is safe to execute. In this project, we make use of recent advances we have made in the areas of automatic theorem proving and security analysis to greatly extend the proof-carrying concept.

Example Project 2 – Secure Verification of Location Claims

Location information is increasingly being used by computer systems to offer services based on where a user is located. For example, the location of a user’s mobile phone can be used to locate nearby facilities such as restaurants or assist the emergency services to respond to a 999 call. In this project we are researching secure techniques for verifying that location information supplied by a user is correct and that they are not making a false claim to be at a particular location. We will apply the results of this research to Vehicular Ad-hoc Networks (VANETs) so that location claims by vehicles can be verified.

Example Project 3 – Software Team Dynamics and Tacit Knowledge

Software development relies heavily on employee expertise, specifically tacit knowledge to produce software. In small teams knowledge is shared easily and problems solved quickly through direct verbal communication. This tacit, undocumented knowledge is a major asset of software SMEs. This research project is investigating the role of tacit knowledge in Irish software SMEs, with a view to understanding the role of team dynamics and documentation in the software process and how tacit knowledge can be shared for the benefit of the company. Its aim is to produce a model of best practice that can be achieved without a major administration overhead.
3/ Modelling and Scientific Computing

SciSym

The Centre for Scientific Computing & Complex Systems Modelling (SCI-SYM) is a centre of excellence for researchers working in high performance computing (HPC) applied to computational and mathematical models for complex systems in engineering, natural and applied sciences. It has been created in 2007.

Sci-Sym as University Designated Research Centre (UDRC).

Scientific Computing and Complex Systems explores models of the natural and artificial world, through high performance computer solutions of problems, which, due to their complexity, are intractable by conventional methods such as experimental, mathematical or semi-analytical methods alone.

Complex systems arise in a variety of fields, e.g. physics, biology, chemistry, eco- and other hybrid sciences, finance, socio-economic phenomena, and others and are truly interdisciplinary. In some cases, a formal model may be proposed and investigated; in others, large amounts of data may be mined and empirically analysed or computational models may be designed and tested against available data.

URL: http://sci-sym.dcu.ie/

Contacts: Prof. Heather Ruskin & Dr. Martin Crane

Modelling and Scientific Computing (Modsci) is a highly-active interdisciplinary research group comprising some 25 full-time researchers (plus associates and student interns) with wide-ranging mathematical, statistical and computational modelling expertise. The Group has extensive external collaborations, which include RCSI, TCD, DIT, ITT, WIT, LM Ericsson and SUN, as well as academic partners in Europe, US and China. The over-arching focus of the group is on computational models and methods in exploring the natural and artificial world through solutions to problems, which, because of their complexity, are intractable by conventional methods. Complex systems arise in many fields, e.g. physics, biology, chemistry, finance, socio-economic phenomena, eco- and other hybrid sciences, to name just a few.

Recently, members of the group, together with colleagues in Maths, Electronic Engineering, Mechanical and Mechanical Engineering and Biotechnology, have been recognised as a University Designated Research Centre (UDRC), led by the School of Computing, under the title of Centre for Scientific Computing & Complex Systems Modelling (SCI-SYM).

Major sub-groups in ModSci. at the current time include:

- Biocomputation (with research on Bio-systems modelling, Bioinformatics, Biometrics, Models of disease, Bio-diversity and AI – for bio and artificial systems and Pattern Recognition);
Financial and Socioeconomic Modelling (including projects in Econophysics, statistics of Accounting, and multivariate techniques in Finance); and

Substantive sub-group in Environmental Modelling (including expertise in Wind and Wave Energy and Pollution Modelling).

For further information, visit: http://www.computing.dcu.ie/research/modelling.html

Example Research Project 1: Drug Dissolution Modelling

The origins of this project lie in an EU FP4-funded project in collaboration with TCD and Elan Corporation to model drug dissolution in vitro. This work was continued, funded under the Biocomputing Strand of the National Institute for Cellular Biotechnology under PRTLI 3, to demonstrate the application of probabilistic and semi-analytical methods to in vitro drug dissolution for a wider variety of drug delivery devices and conditions. Further funding has been secured to extend the model to the design of Therapeutic Implants. DCU’s role is to simulate dissolution and cellular ingress in the implant, with resulting changes in implant mechanical properties, offering possibilities for micro level targeted treatment. With the introduction of Bayesian Inference, direct and inverse Monte Carlo and other probabilistic numerical methods, we believe that the results show enormous potential for the simulation of in vivo targeted drug delivery simulation, a 'holy grail' of drug development and something that would be of potentially huge potential to the Pharmaceutical Industry.

Example Research Project 2: Immune Response Modelling

The aim of this project on modelling immune response to viral invasion, specifically Human Acquired Immuno-Deficiency Syndrome (associated with HIV infection), is to explore the population dynamics for different cell types, based on what is understood or conjectured about cellular mechanisms. Intra- and inter-cellular interactions are investigated in detail, to explore cell survival characteristics and to quantify the influence of additional cell types on disease progression. The viability of adapting some of these ideas to modelling features of other immuno-suppressive disorders is also the subject of exploration. At present there are three project strands in Immune Response Modelling:

- Individual Variation in HIV
- Mathematical Models in HIV
- Cell-level Models of HIV

(All of which are supported by IRCSET EMBARK Scholarships)
4/ Information Management

The Information Management Group has four major themes: Database Engineering and Interoperable Systems, Information System Engineering, Educational Technologies, Business Informatics, and Digital Multimedia (incorporating the Centre for Digital Video Processing).

The Database Engineering and Interoperable Systems researchers develop formal and informal models for constructing database systems, and construct interoperable layers between heterogeneous information systems. Information System Engineering research focuses on models and methodologies for increasing the value of data in information-intensive and networked economies. Business Informatics research focuses on models and methodologies for increasing the value of data in information-intensive and networked economies. Educational Technologies research is currently focused on the improvement of the use of ICT in higher education through Action Research. In the area of Sensor Web, CLARITY is involved in research and development.

CLARITY

There is no doubting the impact that the information revolution has had on our everyday lives. How we learn, work, and play has been forever transformed by the always-on connectivity of the Internet. But this information revolution has largely been confined to the online world and, for many of us, we continue to interact with two very separate worlds: the physical world in which we live and the online world of the web. There has been a physical-digital divide. Every second of every day, information is created through naturally occurring events in the physical world but these events go largely unnoticed and the information is lost. In the world of the Sensor Web this is set to change.

The catalyst for this change will come in the form of a new generation of cheap, reliable, and flexible sensor technologies, which will serve as new peripherals for the internet by bringing a whole new world of input data to the wider web. Accordingly, data will no longer just be generated from the keyboards and scanners of desktop PCs. Instead, these new sensor technologies will permit the sensing of diverse events in the physical world, from the traffic congestion in our streets to the pollution in our river systems, and from energy consumption in our cities to recycling in the home. Sensors that can be integrated with garments, and worn on the body, will permit the capture of physiological data as we exercise or recuperate. In short, this unique combination of sensors, software, and the Internet will enable new types of information services across a wide range of sectors from health and the environment to education, retail, and entertainment.

This is the vision of the Sensor Web. Its guiding principle is that better information helps people to make better decisions and that by harnessing the potential of the sensor web we can help people to live healthier, safer, and more productive lives. For example, decade’s worth of studies about energy usage in the home have shown that by simply informing people about the impact of their energy usage in real-time is sufficient motivation for them to cut their energy consumption by up to 15%.
Realising this vision is not without its challenges and so researchers in CLARITY: Centre for Sensor Web Technologies, are addressing this head on (www.clarity-centre.com). CLARITY is a CSET, a Center for Science Engineering Technology funded by Science Foundation Ireland (SFI), and is a partnership between University College Dublin, Dublin City University and the Tyndall National Institute. Comprised of over 100 researchers at the three sites it has investment from industry partners including IBM, Disney Research, Amdocs, QinetiQ North America, Episensor and Critical Path. Formed in July 2008 it already has funded collaborations with over a dozen other industrial partners in Ireland and abroad. CLARITY focuses on the development of sensor web technologies in areas including health and wellness, environmental monitoring, and digital media.

**URL:** http://www.clarity-centre.org/

**Contact:** Prof. Alan Smeaton

**Interoperable Systems Group (ISG)**

The Interoperable Systems Group conducts research into information management topics such as databases, distributed and peer-to-peer computing, sensor networks and XML interaction between information systems. There are currently five projects ongoing within the group.

The objective of **FastX** is to deliver a native XML database that operates at far greater speeds than is currently possible. While web transactions are all conducted using XML and there are a considerable number of XML databases on the market, none can perform at the required performance levels. In hardware optimisation for XML, the **XSpeed** project uses a hardware accelerator to boost the performance of XML transactions using standard XML query languages.

In the area of sensor networks, the **pSensor** project provides a mechanism for querying any type of sensor device using a standard query language, both in a live streaming environment and in post-activity analysis. The ISG researchers are building knowledge processors that can interpret and process data emerging from sensor networks in an automatic fashion.

The **UbiQuSE** project seeks to develop a Smart Building infrastructure where location based devices can track human movement and offer various forms of assistance as they move through different spaces within the building. The ISG are also collaborators with the large **CLARITY** CSET where we cooperate on projects involving sensor web activities.

**URL:** http://www.computing.dcu.ie/~isg/

**Contact:** Dr. Mark Roantree
Centre for Software Engineering

Raising the capabilities of software and technology organisations

The Centre for Software Engineering (“CSE”) is proud to continue its association with the Final Year Projects of the students completing their B.Sc. in Computer Applications at Dublin City University (“DCU”). In previous years, the standard of these projects has been excellent, in terms of the concepts addressed and the quality of the work, and I have every confidence that this has continued with the Class of 2010.

The B.Sc. course has a reputation for bringing out the very best in DCU students which is why so many of them take up challenging positions and excel in their careers. A number of them have gone on to become leaders in the ICT community in Ireland and overseas and have contributed enormously to the success of the industry. I look forward to each of these graduates making a similar impact on our industry.

The former Head of DCU’s School of Computing, Professor Michael Ryan, founded CSE in 1990. His aspiration was that CSE would engage in an ambitious programme of services to help the then-fledgling software industry in Ireland. In the intervening years, the CSE has operated many support programmes for software and other organisations to improve their technical and business capabilities. This has assisted organisations to succeed in an increasingly demanding and competitive environment.

CSE has developed an international profile through its work in European projects, in establishing international standards and its services to industry in overseas countries. CSE is the primary assessment organisation in ICT in Ireland, having carried out evaluations of processes, products, technologies, projects and organisations. This has included the audit of quality systems, the evaluation and certification of products and due diligence for external investment.

In addition to its work with established organisations, CSE is increasingly involved with early stage companies and endeavours to provide them with knowledge transfer, assistance with R&D and Innovation and support in the development of their product offerings. This is a particularly satisfying aspect of our business, and could become the first contact with the entrepreneurs in DCU’s “B.Sc. in Computer Applications” Class of 2010.

Michael O’Duffy
CEO

The CSE may be contacted at +353 1 700 5750, admin@cse.dcu.ie, www.cse.dcu.ie
Make a smart career move

A career in business technology needs business intelligence to succeed: exactly what you’ll find in the pages of ComputerScope, Ireland’s leading magazine for enterprise computing. For specially discounted subscription details, email subs@mediateam.ie referencing ‘DCU’.

From the publishers of PCLive! TechCentral.ie

Answers + Analysis + Advice
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Title: Travel Budget Planner
Name: Olajide Jatto
Programme: Software Engineering

Project No. 1

The project is a personalised system that allows users to plan for journeys based on preferred and pre-supplied activities on a currently specified budget. Users have user accounts on the system which stores preferences differing among users. Every time a user wants to go on a journey, the user supplies a budget and a location and the system returns:

- Ticket amount.
- Total budget amount in destination currency.
- Advised activities based on budget.
- Cost of activities user wants to engage in.
- Information on destination country.
- If the user has enough money to travel on.

The system is web based and is accessible from anywhere in the world.

The system gives users a personal feel as every interaction between system and user is done based on user supplied information and intelligent advice offered by the system which can be rejected by the user. The personal feel of the system also makes it a pioneer in its type or at least one of the first in the market of its type. The system should come in handy on a lot of occasions when someone is trying to determine where to go and what to do on holidays.

Primary Area: E-Commerce
Secondary Area: Artificial Intelligence
Primary OS: Windows
Secondary OS: None
Primary Technology: HTML
Secondary Technology: PHP
Requirements: Laptop/Own Machine
Title: CP Solver
Name: Gary Noone
Programme: Software Engineering

Project No.2

The critical path problem solving tool is a web based application that can be used to solve critical path problems which will generate and display a network diagram. The application is mainly intended for use as a study aid, to be utilized by students studying the topic. Having previously studied the topic during the course of my degree, I found there were no web based applications that could generate a network diagram when provided with the figures for a critical path problem. This project will be an openly accessible application which will provide users with a network diagram for a given critical path problem.

The main use of the application will be that of a study aid which will allow students to confirm their answers against the generated network diagram. The aim of the project was to produce an easy to use, robust application that can be easily utilized on different platforms and browsers. The system will be very useful to students studying operations research related subjects.

Primary Area: Education
Secondary Area: None
Primary OS: Windows
Secondary OS: None
Primary Technology: Java
Secondary Technology: None
Requirements: Laptop/Own Machine
Programs that are written using lazy functional programming languages are known to make use of intermediate data structures, rendering them inefficient.

A number of program transformation techniques has been proposed to remedy this, which can eliminate the use of some of these intermediate data structures, such as super-compilation, deforestation and distillation. A variant of super-compilation, positive super-compilation is known to be more powerful than deforestation, but only produces a linear speed up in programs. Distillation is an algorithm proposed by Dr. Geoff Hamilton that performs a more powerful optimization than the other algorithms and as a result produces a super-linear speed up in optimized programs.

This project aims to implement the distillation algorithm using Haskell, a higher order functional language, and impose the optimizations on programs using the York Haskell Compiler. Once implemented this project will provide comparisons of the results of distillation, super-compilation, and deforestation as a basis for the findings presented. Based on these findings, the project may also be of benefit to the users of the Haskell language if it were to be implemented as an optimization phase in a compiler.

Primary Area: Compilers
Secondary Area: None
Primary OS: Unix/Linux
Secondary OS: None
Primary Technology: Other
Secondary Technology: Ruby
Requirements: Laptop/Own Machine
Project No. 4

This project is a web-based tool that can solve Linear Programming Problems using the Simplex Method. Linear Programming is concerned with the problem of maximising or minimising a linear function whose variables are required to satisfy a system of linear constraints, a constraint being a linear equation or inequality. The Simplex Method is a method developed by George Bernard for solving linear programming problems. This application will be mainly used as a learning aid for students studying Linear Programming. Lecturers may also find this package useful for teaching.

It will be designed to solve problems with the use of the Simplex Method to produce the optimal solution. Required Information (e.g. number of variables and number of constraints, values of constraints) will need to be inputted by users and will be read using a java applet embedded on the webpage. It will also include the option for users to view the results in a user-guided approach (step by step iterations). Users can also view linear programming problems on the applet interface, work on them independently and then check application for correctness. The package will be accessible on a webpage for students. It will be designed using CSS so it is simple for any user. The website will also contain instructions, rules and printable notes.

Primary Area: Educational
Secondary Area: None
Primary OS: Windows
Secondary OS: None
Primary Technology: Java
Secondary Technology: HTML
Requirements: Laptop/Own Machine
From the onset of the computer age, major Airlines recognised the efficiency that a computer reservation system would bring to their operations. With costs being an issue to all but the largest of companies, the airline industry discarded their manual booking systems in favour of permanently utilising the electronic systems. Several decades later, computers are affordable to even the smallest of businesses, allowing them to enjoy the benefits of enhanced productivity using Information Technology (IT). The major theatres have set up computer booking systems to increase their efficiency, but smaller operations might be hampered in following suit due to budgetary constraints. The main objective of this booking system is to design a system that is fast, convenient, informative, accurate and consistent with the modern day conveniences consumers have come to expect.

This research investigated the construction of a computer-based Graphical User Interface Theatre Booking System appropriate to the niche theatre business.

**Primary Area:** Software Development

**Secondary Area:** Databases

**Primary OS:** Windows

**Secondary OS:** None

**Primary Technology:** PHP

**Secondary Technology:** SQL

**Requirements:** Laptop/Own Machine
The product being developed is best described as online location mapping for individuals. It will allow people to interact with GPS data resulting in multi-year location logs for individuals, which were captured by GPS devices. These logs contain GPS locations and timestamps every five seconds for a number of years. The system was developed to make this GPS data browsable through a Web-based mapping interface. The raw GPS data will be summarised depending on the size of the map view area and the number of points at a given place.

The database is designed to sort and search data in an efficient way. The program will ask the user to select/input date and time or location, summarise the data from the server then view the area and the number of points at the place. The web-interface is the front end of this project. This is what the user will see and will allow them to select some GPS information from the web interface. This will be the least technical element of the product. Asp.net/ PHP Scripts will take information inputted on the website through a HTML application, and send this information to be stored in a database. The scripts will also be used to query the database and display the data returned formatted with HTML style. MYSQL database is the one part of the project that relates directly to the other parts. It will store the information sent to it by the PHP scripts. This information will also serve as the content of the web pages. So what the user sees through the web site, is actually the information stored in the database, but being retrieved by the PHP scripts and formatted with HTML styles. Other functions are available and these will be listed and explained.

**Primary Area:** GPS/GIS

**Secondary Area:** None

**Primary OS:** Windows

**Secondary OS:** None

**Primary Technology:** Java

**Secondary Technology:** SQL

**Requirements:** Lab Machine/Space
Title: Interactive Link Fixer
Name: Ciaran McCabe
Programme: Software Engineering

Project No. 7

The interactive link fixer provides an easy to use broken link fixing software. It scans through the entire website in question, checking all links in each webpage. Having found broken links, it can then provide an automatic solution to fix all the broken links found or, if desired, provide an interactive step through solution of each broken link and the different options available to resolve each link.

Interactive Link fixer is aimed at webmasters and other web designers that are in control of medium to large websites that feature a lot of links throughout the website. This program would run periodically on their website(s) checking all pages for broken links and providing them with an automatic or interactive solution to solve any bad links found.

When the software runs, the interface will give the user the choice of an automatic solution or interactive solution. If the automatic solution is selected, the program goes through checks to try and fix the broken links. Alternatively, the users can select an interactive approach to solve the broken links. The GUI will show the links in question. It also will feature a list of action buttons that, when selected, will run different algorithms to solve the broken links.

Primary Area: Other
Secondary Area: None
Primary OS: Windows
Secondary OS: None
Primary Technology: Java
Secondary Technology: None
Requirements: Lab Machine
The Olmec 3D Modelling Tool is a three dimensional design tool aimed at people new to 3D modelling. The program is presented using a simple and friendly interface whilst introducing the concepts required in the broad range of 3D modelling.

The program is designed to provide an introduction to fundamental 3D modelling concepts: as such these are included as features in the program. The program can support the import and export of models into standard formats.

The system allows for different stages of modelling to be performed, simple vertex models with basic polygon shapes, to fully textured complex models.

As the system is designed to introduce people to 3D design, an altered 3D representation of a model can be made available. This visualisation does not remove any features of the program but makes the depth of the object more easily perceived, overcoming a common problem for people new to 3D modelling.

An example of this interface is ‘chunky’ lines with shading applied to replace simple vector lines, to emphasise an objects shape. This view will be designed to be more appealing to younger users.

The project is written in Java utilising the Java 3D API, it will be released as an open source project to allow for its further development and expansion.

Email: john.needham2@mail.dcu.ie

Primary Area: Graphics
Secondary Area: None
Primary OS: Windows
Secondary OS: None
Primary Technology: Java
Secondary Technology: None
Requirements: Lab Machine
There are different versions of meaning for the term information retrieval (IR) since the idea of using computer to search relevant information was published in an article “As We may Think” by Vannevar Bush in 1945. As an academic definition, information retrieval is finding material (usually documents) of an unstructured nature (usually text) that satisfies information needs from within large IR system collections (usually stored on computers).

This type of traditional cannot satisfy the demand of a group of users with the same information need. The only current possible solution for this weakness is for each individual user in the group to search together in parallel. Obviously, this will result in much duplication of effort and redundancy across the searchers as users in the group have the same demand. The Real-time Synchronous Collaborative Search Engine is a dynamic web application which will concert with real-time searcher activities, implicitly aware of other users and allow for a division of labour and a sharing of knowledge across a collaborating group. This synchronous collaborative system will act as an agency which monitors common activities from user group to search engine, and it also provides an environment which allows instant communication between users who are within the same searching group. More importantly, in order to reduce possible duplicated efforts in a group, an individual user is made aware of other collaborating members, thus some common activities, such as querying the same topic or viewing the same documents, can be divided into portions across users.

**Primary Area:** Multimedia
**Secondary Area:** Network Applications
**Primary OS:** Multi-platform
**Secondary OS:** None
**Primary Technology:** Java
**Secondary Technology:** JavaScript
**Requirements:** Lab Machine/Space
This project is a form of social networking site for musicians. However it has a certain unique feature, it is primarily designed for musicians who are not necessarily in a band. It is designed for musicians who have created a guitar riff or vocals but are looking for additions to their song from other users of the site. An example would be a guitarist looking for a drum beat to the background of his/her guitar. Each member of this site (BandTrap) would have their own profile much like in other social networking sites and would be able to add friends and possibly even band members. They would be able to upload their audio files to their page and allow others to submit audio files that might go well with their work. This could mean that over night a song could be created from users in four different corners of the world without them even meeting properly. This project however is primarily focused on the program that works with the audio files submitted by the user. It would involve the uploading of audio files to a player and have them either mix in with each other or play separately. The program would then analyse each sound file displaying different attributes of the sound file such as length and amplitude.
School of Computing
Final Year Projects
Expo 2010

Title: Hieroglyph Learning Program
Name: Rachel Shanahan
Programme: Software Engineering

Project No. 11

The program is to enable users to teach themselves the Ancient Egyptian hieroglyph language. It is aimed at beginners and will teach the basics of the language. Its features enable the user to practice their new skills in a fun and educational environment.

There are four sections to the program. The first of these is the lesson area. Starting with the basic concepts of the language, each lesson builds on the previous one.

The practice area of the program contains a small paint application. Here the user can practice drawing the hieroglyph symbols from the lessons to help reinforce them. The program will then analyze their drawings and help them see any areas where they have gone wrong.

There is also a game area. This contains two mini-games to allow the user a break from learning. They are both orientated around Ancient Egypt.

The final section to the program is a small factual area. Here the user can also learn about the people and the era. This helps to widen the user’s knowledge of the language as its development was heavily based on the lives of the people.

Using these components, the user should be able to build up a satisfactory knowledge of the language, and also an understanding of the people of its time.

Primary Area: Educational
Secondary Area: Image/Video Processing
Primary OS: Windows
Secondary OS: None
Primary Technology: Java
Secondary Technology: None
Requirements: Lab Machine
My project proposal is to translate the Lavallee and Hidiroglou algorithm from the SAS language to the R statistical language. This will involve gaining a complete understanding of the Lavallee and Hidiroglou algorithm, expanding my knowledge of the R language, performing comparisons between Lavallee and Hidiroglou stratification and geometric stratification and presenting all using a GUI interface.

Stratification is a procedure which breaks a population into mutually exclusive groups from which sampling is done independently from each group. It is an important technique of survey design. The Lavallee and Hidiroglou algorithm is designed specifically for stratifying skewed populations. R is a programming language and software environment for statistical computing and graphics. It has become a de facto standard among statisticians for the development of statistical software.

The Lavallee and Hidiroglou algorithm is an important part of stratification and is therefore used by many researchers and statisticians in survey design. As the algorithm is already written in SAS, it excludes the researchers/statisticians who use the R statistical language.

By translating the Lavallee and Hidiroglou algorithm to R, we are opening it up to a wider group of statisticians, researchers and even students with knowledge of the R language. This in turn will be very useful when it comes to making comparisons between using the power allocation with the algorithm, which was the preferred option with Lavallee and Hidiroglou, or by using the strategy proposed by Gunning and Horgan where they use the Neyman allocation resulting in geometric stratification.
This project is an Examination Marks System for the lecturers of DCU. It allows lecturers to login securely to a database of student examination results. A record of continuous assessment and exam marks will be stored and these are used to provide other useful information for lecturers e.g. marks required for next grade or compensation marks required. Once they login they will be able to search by student name, student number, module or class. This will make finding or updating a particular student fast and efficient. After their search a list of student details will be shown, student number, student name, marks and grade. More student information is available via a collapsible panel. There is also a backend feature that will allow administration staff to login and add students/users and update records in the database. There is an emphasis on security and measures have been taken to prevent SQL injection attacks and all passwords are MD5 encrypted. At present lecturers do not have a facility for this in DCU and can only view a students final result. This system fulfils a need that lecturers have and provides them with more information to give them a better view of student achievements throughout the year, allowing them to make more informed decisions when reviewing student results. This project was developed using a mySQL database for back end data storage, apache server for sharing data and PHP to communicate between the interface and the database. Design and quality are where I feel my skills are strongest so I have placed a high emphasis on usability, satisfying the needs of the end user, overall project design, database efficiency and high-quality database structure, which is normalised to the 3rd normal form.

**Primary Area:** Internet

**Secondary Area:** None

**Primary OS:** Windows

**Secondary OS:** None

**Primary Technology:** PHP

**Secondary Technology:** SQL

**Requirements:** Laptop/Own Machine
Title: Solutions Interactive
Name: Laura Stafford
Programme: Information Systems

The purpose of this project is to develop interactive solutions to the end of the Normal Distribution chapter exercises of the “Probability with R”: An Introduction with Computer Applications book by Jane M. Horgan. The Interactive solutions will be an addendum to the book, along the lines of the Tutorials Interactive currently on the CA219 web page.

The interactive solutions application is intended to assist probability students in gaining the required knowledge of the Normal Distribution. The tutorial allows students to go through the end of chapter questions and view the solutions in a step-by-step fashion. The solutions are graphically displayed where necessary. Students are also able to enter in their own values in order to test their knowledge.

This project was completed using R, HTML and Java skills.

Primary Area: Educational
Secondary Area: None
Primary OS: Windows
Secondary OS: None
Primary Technology: R, Java
Secondary Technology: HTML
Requirements: Laptop/Own Machine
Title: Tutorials Interactive
Name: Bronwyn O’Toole
Programme: Information Systems

Project No. 15

Tutorials Interactive is an online tutorial which will enable students to learn aspects of the CA219 Probability coursework. It is based on the exercises in chapter 12 of Jane Horgan’s book entitled “Probability with R: An Introduction with Computer Science Applications”. The student will view a tutorial of how the hypergeometric distribution is calculated. They will then move on to the next step which consists of a similar question. The student will not be able to move onto the next step until the correct answer is given. This ensures that the student will interact with the tutorial, not receive the answers and move on. The student will also have a chance to learn how to code these exercises in R once they have passed the testing section.

Primary Area: Educational
Secondary Area: None
Primary OS: Windows
Secondary OS: None
Primary Technology: HTML,R
Secondary Technology: JavaScript
Requirements: Lab Machine/Space
Missile Defence is a simulation program that simulates the US Missile Defence Agency's Missile Defence network.

Missile Defence utilises an engine written in C++. Missile Defence simulates each element of the Missile Defence network, including fixed radar, space satellite tracking, co-ordinated defence response systems, and communication systems.

A Simulated World object is used as a container for the various entities within Missile Defence, with a Communications object utilised within the Simulated World for data handling.

The open source Simple Direct-Media Layer (SDL) graphics library is used to visualise each simulation as it is executed. The Microsoft Visual Studio 2008 Integrated Development Environment (IDE) was utilised to build the system. The use of open source libraries allows the system to be compiled on various platforms (such as Linux based Operating Systems).

Users of the system can input various simulation parameters, which allows for a flexible system that end users can tailor to their requirements. It is hoped this system will provide users with a clear understanding of how the complex Missile Defence network operates.

Primary Area: Artificial Intelligence
Secondary Area: Graphics
Primary OS: Windows
Secondary OS: None
Primary Technology: C/C++
Secondary Technology: Other
Requirements: Laptop/Own Machine
Title: Ro-Buddy
Name: Declan Whelan
Programme: Software Engineering

Project No. 17

Ro-buddy is a game best likened to the once popular virtual pets in which the player must interact with an on screen character and play games with it. The user input, rather than relying on keyboard, mouse or game pad is taken from a webcam.

The player uses coloured markers of primary colours as well as various hand gestures in order to interact and play games with the on screen character. There are various mini-games which the player must take part in in order to keep the character healthy, a statistic which is saved between games. This means that a player must also interact with the robot on a regular basis in order to keep it alive, as its health may degrade between plays depending on how much time has passed.

This game is created using a back end camera system which uses the Intel OpenCV library as well as a front end which utilises the Simple Direct Media Layer (SDL) library. The project is programmed entirely in C++ and is being developed on a Linux platform, however as all libraries are cross platform, it can also be run on other operating systems.

Primary Area: Digital Signal Processing
Secondary Area: Gaming
Primary OS: Unix/Linux
Secondary OS: Multi-platform
Primary Technology: C/C++
Secondary Technology: Other
Requirements: Laptop/Own Machine
The purpose of the WatchIT system is to create an on-line application which enables a user to record, search and analyze system data from multiple machines all in one location. The data can be gathered from various sources such as applications, program log-files, and the output from utility programs such as vmstat, mpstat, top etc. From the data gathered a user can either create or use inbuilt rules to search the data and create reports and graphical reports such as a line chart depicting CPU usage over period of time.

WatchIT also acts as an alert system, and can send e-mail warnings if it detects a predefined situation is occurring. As well as this, WatchIT has its own shell to allow users to access most of its functionality from the command line.

**Primary Area:** Network Applications  
**Secondary Area:** None  
**Primary OS:** Unix/Linux  
**Secondary OS:** None  
**Primary Technology:** Python  
**Secondary Technology:** None  
**Requirements:** Lab Machine/Space
DMPT is a toolkit for musicians learning a music piece. It is directed at musicians of all skill levels, who play any musical instrument. It can also be used by music teachers needing sheet music fast but don’t have the time to transcribe a piece by ear. With sheet music, the average musician can learn the basics of a piece of music in less than an hour. Without sheet music, learning a piece of music by ear can take hours, even days, depending on the complexity of the music they are trying to learn. DMPT offers two main functions to the user.

One is the option for musical transcription. This function analyses a file inputted by the user (.wma or .mp3 file), and extracts out all the notes from that file. It then generates sheet music and displays the notes extracted for the user to view. The second option is chord detection. Using an extended and slightly modified algorithm, more than note detection, it analyses the input file and displays the chords played throughout the piece of music. Not all musicians can read and understand sheet music, but almost all can read and play chords, making this tool beginner accessible. All over the world there are programs that claim to do full musical transcription, but there is no clear leader, or no one program that claims to do it all. This brought the motivation to develop a program that could be used by everybody for musical and educational purposes. This program is developed in Matlab and Java, and uses the Fast Fourier Transform (FFT) algorithm as its basis for analysis.
IsoLibSDL is an open source 2D isometric graphics library designed to provide a flexible and simple system for developing games. It is written in C++ using the open source Simple Directmedia Layer (SDL) and XMLSource libraries.

The project focuses on being polymorphic, i.e. users have multiple ways of doing the same thing and all interfaces are similar and logical. By doing this, rework is hopefully reduced on the user end.

As a resource control tool, XML is very flexible, it allows changes to be made to the library without affecting the relevance of the related XML files and for objects to be added and removed from the related XML files without causing the system to crash.

Ideally, projects using this library would not require much programming work to get off the ground. The real power in the system is that most of what makes a game unique: entities, control schemes, graphics, can be completely defined using an XML schema.
AndEditor will be a text editor application for the Android mobile platform. The editor consists of a user interface and a text input interface that allows the user to both view and edit existing files. The basic implementation of the editor will allow the reading and editing of web languages through the use of an inbuilt syntax hi-lighter. The syntax highlighter used will depend on the extension of the saved file, and new files will need to be saved for highlighting to take effect. Initially only web code will be included but an easy language addition facility will also be included to future iterations to allow easy reading of other languages.

The Project itself is coded in a combination of java and XML, Java being the backend and XML providing visuals to the front end. In early instances of the application the editor will rely on an external application of the users choice to both upload and download the source files to and from the hosted locations. Later instances will contain an inbuilt client to allow the application to perform independently.

**Primary Area:** Document Processing  
**Secondary Area:** Mobile Phones  
**Primary OS:** Android  
**Secondary OS:** Windows  
**Primary Technology:** Java  
**Secondary Technology:** XML  
**Requirements:** Lab Machine/Space
The aim of this project was to create a new take on the classic game of Tic Tac Toe for the Android platform. X/O Legacy is an innovative twist to a much-loved classic game, and offers challenge and excitement to all players.

The AI system allows players of all skill levels to experience the game’s features via selectable difficulty level, and the random distribution of power-ups ensures that no two games are identical.

The game was created using the Android SDK plugin designed for the Eclipse IDE, with all code produced within a Windows development environment.

Features

1. Board Manipulation–The player can swap lines in the grid vertically or horizontally, replace an opponent’s symbol with their own, or even eliminate a grid position from play entirely–every game can change in an instant...

2. Power-Ups–The player must earn the right to wield power by completing a touch screen event, with success rewarding them with added power. However, fail and your opponent could be the one with the power...

3. Replay Value–The player can compete to finish the game in campaign mode or attempt to beat their own best efforts in high score mode–there is no ‘Game Over’...

Primary Area: Gaming
Secondary Area: Mobile Phones
Primary OS: Android
Secondary OS: None
Primary Technology: Java
Secondary Technology: None
Requirements: Lab Machine
Title: Arena: a World Wide Mind project
Name: Oli Bird
Programme: Software Engineering

The Arena project is an augmentation of the World Wide Mind project. It involves the construction of a World that represents an interface between an instance of a running Quake 2 game server and minds that are constructed by researchers. The generic world interface is being developed separately (Mac Fhearai and Humphrys 2009). Arena serves two main audiences: not only does it allow researchers to construct minds and work in a collaborative fashion to solve the problems of Quake 2, but it also give students a framework through which they can explore basic ideas of Artificial Intelligence—specifically those that deal with state-driven automata. Arena also produces movies of automated runs for later inspection and display.

Primary Area: Artificial Intelligence
Secondary Area: Educational
Primary OS: Unix/Linux
Secondary OS: Multi-platform
Primary Technology: Java
Secondary Technology: Other
Requirements: Lab Machine
Title: Geo-Twitter Application for BlackBerry Smartphones
Name: Fiona Carton
Programme: Software Engineering

The system is an application for BlackBerry smartphones that allows users to connect to the web application “Twitter”. It allows users to log in to their Twitter account and send updates to the Twitter web service and receive updates from other users on demand. Users will be able to search Twitter with keywords from the application and view a list of updates that mention the logged in user. It also allows users to download updates from other users that are nearby, enabling them to remain geographically aware as they use Twitter. Searches can also be performed on nearby updates, helping the user to discover more relevant updates. The application also tracks where the user has updated from and allows them to view the location of their tweets on a map. The application integrates with the BlackBerry’s built in GPS tool to determine the user’s current location and uses Twitter’s geotagging API to determine which updates are coming from nearby.

The application is aimed at Twitter users who use Twitter “on the go” and are interested in what people nearby are tweeting about.

Primary Area: Mobile Phones
Secondary Area: GPS/GIS
Primary OS: Other
Secondary OS: None
Primary Technology: Java
Secondary Technology: None
Requirements: Laptop/Own Machine
Title: Java Text Editor
Name: James Doran
Programme: Information Systems

### Project No. 25

This project involved making a text editor that will be useful for editing general text and for coding in Java or HTML. This kind of programme would be useful for students or employees who need a free text editor that can handle Java/HTML and normal text. I tried to include many of the useful features of Microsoft Wordpad/Editplus such as:

- The selection of fonts and text sizes; be able to bold and underline text; Print Previews; Image import; Undo Redo; Bullets and numbering; Word count; Spell check and improving this by adding an option to have the computer read out a text file to a user who is visually impaired.

- It is useful for coding purposes as it includes syntax highlighting for Java/HTML keywords and an auto indent feature. Also the lines are numbered to help locate errors during debugging. I tried to make this editor compatible with all versions of Windows and MacOS systems.

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<td>Laptop/Own Machine</td>
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</table>
An HL7 Integration engine provides an interface for a health care environment to communicate with legacy systems using HL7 messages. HL7 is an international standard for medical messaging which deals with electronic interchange of clinical, financial and administrative information among healthcare-oriented computer systems. HL7 messaging syntax varies from area to area and therefore integration engines are required to parse the information contained within the messages to provide other systems with correct information. Third party software providers require an interface to the healthcare information which is sent in HL7 messages to provide current information. Integration is therefore required and is seen as the vital step in creating a fully electronic health record in hospitals.

Current interface engines are costly and require considerable expertise in HL7 and various other areas, factors which engender a great cost to a healthcare environment. This engine, however, is designed and developed to provide healthcare environments with a safe, reliable and cost effective solution to integration needs. With current integration engines, specialised personnel are required for the setup and maintenance of integration. This is not the case with this software. This engine provides a novice user with a safe, guided approach to defining new syntaxes for HL7 messages whilst still addressing all the needs of experienced users that current engines cater for. The software comprises an ASP Web application with C# code behind which creates new syntax files through the use of a Syntax Wizard. The Syntax Wizard generates XML files which are transformed via XLST files to provide the user with a guided approach to integration. Also included is a C# windows service which deals with all incoming messages and parses the information into a database and a C# Windows Form to manually send HL7 streams.

Primary Area: Software Development
Secondary Area: Other
Primary OS: Windows
Secondary OS: None
Primary Technology: .NET
Secondary Technology: C#
Requirements: Laptop/Own Machine
This project is a system for managing 3rd/4th year computer applications projects. The system will be designed so that it can manage all aspects of each individual project. This project is aimed at both students and examiners. The system’s primary function will be to allow students to electronically submit all of their project deliverables and in turn allow examiners to track and manage their own students’ projects (that they are supervising) and update their availability for project demonstrations. The system will also have a facility for the project coordinator to manage all aspects of the exercise such as the documentation that the students have submitted and the timetable for the project demonstrations.

The system will maintain a status database of all projects. This will include a description of each project, assignment of supervisors to each project as well as the documents received. It will contain a contact/progress log for all students and supervisors. This will aid examiners in determining how much contact was made between students and supervisors during the project design process. It will also allow staff to electronically submit marks to a central database. The students will then be able to view their own individual marks for their project. In the long term the system will need to maintain a year by year database and also keep statistical information on trends in project type, marking patterns etc.

This project will prove extremely useful in the future as it will abolish the need for all documentation to be done on paper, saving the project coordinator a lot of space in his/her office. It will also be good for the environment. The system will make it easier for students to make contact with their particular supervisors and promote better communication between the two. One of the most significant things that this system will be able to do is to allow future generations of students to view previous project trends and descriptions which may help them in deciding what they want to do for their own project.
Settlers of the World is a game that I am developing which is based upon the popular board game 'The Settlers of Catan.' I have not found a well implemented version of Catan on PC, and this project is an attempt to fill the void, while at the same time adding elements to the basic game play. This is a four player turn based game which is intended for play against human opponents running the game over a network. The game contains some features that set it apart from Catan. The players are given freedom to fine tune the rules used in game, and players also have access to different 'character types' to make building some structures easier, while making others harder to build. The Graphical User Interface is of a relatively simple point and click design, and players are notified of any in game changes made by other players as they occur. This project has been developed in a windows environment, and has been programmed in C++ using the Code::Blocks Integrated Development Environment.

Primary Area: Gaming
Secondary Area: Network Applications
Primary OS: Windows
Secondary OS: None
Primary Technology: C/C++
Secondary Technology: None
Requirements: Laptop/Own Machine
“Dez” Company Management System is a web based application designed to handle transactions, received from customers upon activation of a particular software package. Developed exclusively for Insolv Technologies Ltd. (http://insolv.co.uk/), it handles all invoicing tasks (including invoice generation, reconciliation and credit notes), stores customer information, provides reporting, data mining services and has an integrated software release distribution function.

This system was designed with significant user involvement from the very beginning and it has passed through user acceptance testing in a real commercial environment, to make sure that its functionality satisfies all client requirements.

Application is presented to user in a form of .aspx web page and can be accessed from anywhere using any web browser. To ensure maximum security of the system and confidentiality of the data contained within, every user has to have sufficient authorisation to access different application features.

“Dez” Company Management System was developed in .NET using ?Visual Web Developer 2008? IDE. All application data is stored on SQL server 2008 which is hosted on a web server.

Primary Area: Other
Secondary Area: Databases
Primary OS: Windows
Secondary OS: None
Primary Technology: .NET
Secondary Technology: SQL
Requirements: Laptop/Own Machine
Title: SwitchBall
Name: Eoin Costelloe
Programme: Software Engineering

Project No. 30

This is a two player 2D game called SwitchBall where two teams compete to score goals within a set time limit. It is loosely based on basketball where the players can pass the ball between themselves and shoot at the goal. Each team has 3 players where the user controls their team’s captain and Artificial Intelligence controls the other team members. Each player has specific attributes which are speed, strength, interception range, interception strength and tackle range. When a player passes the ball, all players remain still and the user must guess if their strength is enough to pass to other team members or to shoot.

The user can select from a set of predefined maps and teams with which to play. The user can also create and customize teams from a set of defined players which they can then use within the game. This game can also be embedded onto a website to show a quick preview of the games functionality.

SwitchBall is a portable game with enough diversity and complexity to keep the user entertained and also combines a competitive environment with the simplistic controls and addictive nature.

Primary Area: Gaming
Secondary Area: Artificial Intelligence
Primary OS: Multi-platform
Secondary OS: None
Primary Technology: Java
Secondary Technology: XML
Requirements: Laptop/Own Machine
Many companies around the world have software specifically for communication, meetings and presentations. These systems are generally built for Windows. Windows is incredibly temperamental and insecure at the best of times. A UNIX based system would be much more stable and secure, which led to the invention of MIBU.

MiBU, is an activity suite based on Mac OSX and the Apple iPhone. It allows online presentations, announcements and communication on both platforms. Most businesses use this technology but it is constricted to Windows platforms. Businesses also tend to use Blackberrys but these have very little integration with the software on the user’s computer.

With MIBU users can use their iPhone to see or present a presentation, communicate with other employees and post messages on the company cork board.

On their Mac, users can host and view presentations, upload PowerPoint presentations, view and edit the company cork board, communicate with other employees and view other information about the company.

This means that businesses can have the same functionality for free on a much safer platform. It communicates information through both Twitter and Facebook.

This is made easily accessible through the Twitter and Facebook APIs. It can be used to remind employees of meetings or even organize them with relative ease. This of course only applies to certain types of businesses.

Some of the larger software companies in the world make a lot of money from selling bloated and temperamental systems. MiBU is an open source project that can be adapted to any company.
This project is a Dublin Bus timetable and bus stop maps application for the iPhone OS platform. This platform includes all devices which run iPhone OS. The application has all the information the user requires to navigate the labyrinth of routes Dublin Bus currently operate.

The application has a favourites view where the user is able to save their favourite bus routes for quick access. A search view where the user is able to search by bus route. A news section where users are able to get the latest news from Dublin Bus and the latest buzz around the city from Twitter. The application also has a tourist information section. This allows visitors to Dublin, whether from a different part of Ireland or from another country, to learn about and use Dublin Bus.

Alongside the above features the application has complete timetables for all routes operated by Dublin Bus.

The key feature of this application is the maps aspect. This allows the user to view bus stops for each route on a map. Using the iPhone OS platform’s GPS capabilities the user is able to view nearby bus stops.

A new technology to the iPhone Platform and computing industry is “augmented reality” which allows the camera on the device to be overlayed with information. Using the iPhone OS platform’s GPS the application overlays bus stops for a augmented reality view of the bus stops around the user. This allows the user to associate information on screen with their surroundings.

**Primary Area:** Mobile Phones

**Secondary Area:** Multimedia

**Primary OS:** iPhone

**Secondary OS:** Android

**Primary Technology:** XCode

**Secondary Technology:** PHP

**Requirements:** Laptop/Own Machine
Title: Augmented Reality Navigation

Name: John Smyth

Programme: Software Engineering

The project is an information presentation and navigation application for the iPhone, which makes use of Augmented Reality. Augmented Reality is a new technology with exciting prospects for future development. Augmented Reality (AR) is a live view of a real-world environment, merged with computer-generated imagery. In this case the live view is seen through the camera of the iPhone. The augmentation is in real-time. Artificial information about the environment and the objects in it can be stored and retrieved as an information layer on top of the real world view. When people use this application they are able to use a Google Maps interface to search, get directions and view points of interest in a map view. There is also a facility for the user to save their favourite places using a favourites option. They are also able to view their searches in an Augmented Reality view. For example if a user searches for a nearby hotel they can view the direction of the hotel on the map and then switch to the AR mode which displays the hotel’s location on their iPhone camera screen. Another feature of this application is a navigation utility guiding the users to their destination by means of a directional line overlaid onto the Augmented Reality screen.

Primary Area: Mobile Phones
Secondary Area: None
Primary OS: iPhone
Secondary OS: None
Primary Technology: XCode
Secondary Technology: None
Requirements: Laptop/Own Machine
Title: Solutions Interactive
Name: Mervyn Fealy
Programme: Information Systems

Project No. 34

The project that I have proposed, as part of my fourth year project, is entitled Solutions Interactive. This particular project idea was suggested by Jane Horgan. Through this project I intend to create an interactive online tutorial system to help those students studying in the second year Probability (CA219) module. The online solutions interactive system will give users a greater understanding of the concept of a Binomial Distribution. The system will achieve this by giving students a stylish, understandable and user friendly online interface from which to work.

The Binomial Distribution is an integral part of the second year Probability course. Although Solutions Interactive will be used as a great learning tool by students it should be used as a supplement to the textbook, “Probability with R: An Introduction with Computer Science Applications” by Jane Horgan. All exercises that will be shown in the Solutions Interactive online tutorials will be taken from the aforementioned book and can be found in the chapter related to the Binomial Distribution. The students will be given a walkthrough of each exercise showing the both the mathematical theory behind each exercise and the solutions to each exercise as they progress. Therefore the objective behind Solutions Interactive is to enhance all students understanding of the Binomial Distribution in a logical and enjoyable fashion. Students will be able to access Solutions Interactive online via any basic web browser, for example Windows Explorer or Mozilla Firefox.

Primary Area: Educational
Secondary Area: None
Primary OS: Windows
Secondary OS: None
Primary Technology: HTML
Secondary Technology: JavaScript
Requirements: Laptop/Own Machine
Title: EAIFS–Easy Access-Anywhere Infinite File System/Solution
Name: Richard Nel-Boland
Programme: Software Engineering

Project No. 35

EAIFS is an online, web based file system and manager tool. It allows users to have access to all their important documents and files from anywhere in the world. All users need to do is log in through the webpage portal and they have a Windows style file manager with which to work. Here they can completely manage all their files, be it download, upload or deleting etc.

The motivation for this project was pretty simple. Nowadays people need access to their important documents everywhere they go, that important PowerPoint presentation, or even just their favourite music. Most people carry around a simple USB key with all these. This however has quite a few drawbacks. If the USB is lost or stolen, gets broken or simple doesn’t have the required capacity, then it can’t really be relied on. EAIFS allows its users to store all their files on it and as standard removes all the above issues with USB. EAIFS cannot be lost or stolen and most importantly it will never lose your data. As an added bonus the file capacity is actually infinite! Users can put terabytes of data here and then still put more. Another bonus is no installation required; just have a modern web browser.

EAIFS can do all this because it is built to harness the power of Cloud Computing, specifically Amazon’s S3 (charged service) from their web services library. S3 allows for simple storage of single files. EAIFS takes this concept and places a file system across this, where each user has their own file system out “in the Cloud” waiting for them. EAIFS itself is built upon the Ruby on Rails framework, which is great for developing very powerful web applications.

Primary Area: Distributed Systems
Secondary Area: Internet
Primary OS: Windows
Secondary OS: Multi-platform
Primary Technology: Ruby
Secondary Technology: JavaScript
Requirements: Laptop/Own Machine
Title: CHIPS–An Automated Strategic Sports Betting System
Name: Lorcan Wogan
Programme: Software Engineering

In today's world more and more tasks which were previously completed by individuals have now become automated to reduce the human error factor. This program eliminates this factor in sports betting. The main reasons why people usually lose money from gambling is because they do not carry out enough background research on the teams and players involved, the gambler places bets based on a “hunch” or after losing a bet they proceed to chase their losses with riskier bets. By following a logical process this program achieves a higher success rate than the average person.

The program focuses on the sport of rugby union. It regularly gathers statistics on recently played games such as each team's tries scored, conversion success rates etc. It also checks which teams won at various markets given by bookmakers, for example which team scored first and what type of score it was. This helps the betting program to build up a database of information on which it can analyse to help pick safer bets. It does this by calculating what it thinks the probability of an event occurring is and then compares this to the market odds given. If the odds given are better than the chances of winning a bet will be placed. It keeps track of bets won and lost in a virtual balance so the user can see if the program is making a profit or loss.

Primary Area: Other
Secondary Area: Other
Primary OS: Windows
Secondary OS: None
Primary Technology: Java
Secondary Technology: PHP
Requirements: Laptop/Own Machine
Title: Warhammer 40,000 Statistical calculator
Name: Shane Richard Andreucetti
Programme: Software Engineering

Project No. 37

This aim of this project is to provide a statistical calculator reference tool for the table top war-game: Warhammer 40,000 (hence forth refereed to as WH40k).

This game allows players to “fight” battles taking place in a fictitious universe that is set in the year 40,000AD (hence the name). These battles involve armies made up from high detail metal and plastic models that represent the armies of the dozen or more races that are playable within the games system.

To excel at this game, a prospective general must have an acute understanding of strategy and tactics. However, as history amply proves, even the greatest of commanders can be undone by the simple hands of bad luck.

WH40k is no different for though one needs planning and forethought to defeat their opponent, the actual mechanics of the game are based upon dice rolls and they can be fickle indeed.

From this, entails the idea of this project: a tool that allows a gamer to test their models’ performance against a variety of opponents that they might encounter. All models great and small use the same rule set to govern how they behave on the table. These rules give each model statistics that are compared and then combined with dice rolls which yields results.

This project focuses only on what “combat phases” of the game: shooting and close combat. Of these, shooting is far less complicated but both use the same basic principals of calculation.

The value of such an application is that it will allow a gamer to test unit combinations and equipment selections for his army quickly and cleanly without having to do the maths himself which to most, would be a boon.

Primary Area: Gaming
Secondary Area: None
Primary OS: Windows
Secondary OS: None
Primary Technology: Java
Secondary Technology: None
Requirements: Laptop/Own Machine
Title: Interactive Reports
Name: Steven Connolly
Programme: Software Engineering

Project No. 38

This Project will attempt to create a Product allocation and interactive Reporting System using javascript and the .Net framework. The Goal is to present a Professional Application for Businesses which will incorporate individual parts of their processes into one integrated system. The particular attraction of this System will be the inclusion of advance reporting capability. These reports will provide Management with customer, product and staff information gathered from the individual Database tables use during the day to day operation and combine them to display Customer trends and staff metrics in a clear and easily understood way.

The Interactive element of these reports will allow for users to get specific information for a selected portion of a report. For example, after generating a report on all staff and their sales, a user will be able to select a particular staff member on the report to see only information on them broken down by product type or some other defined filter. The P.A.R.R.S. system will provide users with a complete business system with multiple operator levels and a large range of control on the function of the system. The System will be developed in order to create a highly dynamic application which any future business can incorporate into their needs easily. The System’s main feature is in its reporting capability. Reports will be highly graphical and interactive, which the information management can view and read. It should be a great asset in the future advancement of the business and will show business’ areas in which to discontinue or increase time and resources. Other Features which will be included in the System will be the user access levels. This function in inherent in ASP.net and will enable business the option to create Kiosk displays or restrict unauthorized personnel from accessing information. This roll allocation will be a helpful and a reassuring feature for management and users in a very security conscious environment.

Primary Area: Databases
Secondary Area: None
Primary OS: Windows
Secondary OS: None
Primary Technology: .NET
Secondary Technology: Other
Requirements: Laptop/Own Machine
“When is the rain going to stop?” “When is the rain going to start?” For many people that is all they want from a weather forecast. So write an application which analyses the rainfall radar available from http://www.met.ie/latest/rainfall_radar.asp and which answers the simple questions, dependent only on your location in Ireland. This was the question faced at the outset of the project.

The aim of the project is to analyse the precipitation radar on the Met Eireann website and extract the important and appropriate data from it which will allow the users of this project to create accurate readings of rainfall in particular areas of Ireland.

The project is completed using the Java programming language. Java was the chosen language for this application and it was hoped to make use of the many readily available libraries and Java APIs to help with the graphic manipulation of the radar. The chief task faced was to develop an algorithm and program that will extract and calculate the necessary information.

It was intend to create a very user friendly Graphical User Interface that will allow the user choose an area in Ireland and receive information back on when it will or will not rain in the chosen area. The user will also be informed of when it will start and when it will stop raining in the location chosen. It was proposed to also incorporate the finished program into a webpage for easy access and ease of use.

This application will be useful to weather enthusiasts and more importantly to those who just wish to predict when it will start and stop raining in the vicinity.

**Primary Area:** Image/Video Processing  
**Secondary Area:** None  
**Primary OS:** Windows  
**Secondary OS:** None  
**Primary Technology:** Java  
**Secondary Technology:** HTML  
**Requirements:** Laptop/Own Machine
Title: Staff Allocation Optimisation System
Name: Ciara Hill
Programme: Information Systems

This research-based project automates the allocation of staff to tasks taking into account staff skill level per task and the weight of each task. This is an instance of the Generalised Assignment Problem (GAP) which is an NP-Hard combinatorial optimisation problem. While a number of approaches exist to tackle the problem, this project employs Particle Swarm Optimisation (PSO)—a population-based stochastic optimisation technique used in artificial intelligence and non-linear programming problems to suggest candidate solutions and arrive at an “best” solution.

This project adapts the PSO algorithm to a small-scale human resource management task and implements it using Matlab. This project evaluates the outcomes using human trials where the opinions of subjects regarding hypothetical assignments are gauged. It also considers limitations and possible extensions of this work in the context of real-life scenarios.

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Primary Area: Other
Secondary Area: None
Primary OS: Windows
Secondary OS: None
Primary Technology: Matlab
Secondary Technology: None
Requirements: Laptop/Own Machine
The presence of computer games in modern society is more prominent than ever with advertisements for them appearing on billboards, radio, television, the internet and even within games themselves. A well-developed game can stand out from the abundance of products available today. Also, the popularity of smartphones, such as the Apple iPhone, Nokia N series, Blackberry and phones utilising Google’s mobile phone operating system Android, is rising at an exponential rate.

Applications on these phones, often available through an online store specially designed for that platform, have created a new market for developers. Google’s Android operating system is one of the more recently released smartphone platforms and is rapidly gaining popularity. Standard functions of the system include a player character (PC), a number of non-player characters (NPCs), inter-character dialogue, exploration of a game map, a player inventory and a turn-based battle system. Enemies encountered during the battles have a certain level of artificial intelligence in order to defend themselves. Upon starting a new game, the user is presented with an opening sequence establishing the story behind the game. The user is then placed in an introductory battle, guiding them through how the battle system works. The user has a number of menus which can be accessed via the pause menu, e.g., the inventory screen, save screen, load screen, settings screen, quit option, etc. Once in the main body of the game, the user is given an objective: to follow the legend of the golden beard.

**Primary Area:** Gaming  
**Secondary Area:** Mobile Phones  
**Primary OS:** Android  
**Secondary OS:** None  
**Primary Technology:** Java  
**Secondary Technology:** XML  
**Requirements:** Laptop/Own Machine
Title: Shop Compare  
Name: Matthew Gaffney  
Programme: Software Engineering

Shop Compare is a Mozilla Firefox add-on which enables a user to shop online and keep track of items they have added to the Shop Compare basket. This is achieved by the user adding the item by dragging and dropping the item image into the Shop Compare basket and inputting the price (if the add-on is run on the same domain, it can add item information automatically).

This becomes very useful if a user shops over many different online shops. The user will be able to keep a track of all their items from the one location and at the same time see the total cost of all their items. The user can clearly see what they are spending their money on and where.

While the user is shopping, they can remove items from the Shop Compare basket individually or remove all at once. The user will also be able to change the currency of their total shop.

Besides using the Shop Compare as a useful management tool to keep track of spending it can be used as a wish-list of items that a user would like to buy. The wish-list would be saved to the user’s computer so that it can be accessed later on if required.

Primary Area: E-Commerce  
Secondary Area: None  
Primary OS: Multi-platform  
Secondary OS: None  
Primary Technology: XML  
Secondary Technology: JavaScript  
Requirements: Laptop/Own Machine
Project No. 43

The evolution and enhancement in multimedia technologies in the past number of years has raised the level of awareness and demand for learning platforms using multimedia capabilities.

A Virtual Classroom ('VC') is a system that provides collaborative learning over the Internet. A VC allows students to enter and join a selection of classes to exchange questions, instant message, share files and also to receive multimedia in the form of a live video broadcast. A lecturer can broadcast to his/her class and share numerous types of content such as PowerPoint slides and PDF documents. Broadcasting the video over the Internet means any number of students can watch the class at the same time. The students can watch the class together in a classroom setting or alternatively they might be dispersed over various geographic locations.

The facilities will mean that the students can easily access a wide range of learning tools and materials. A student does not need to travel to the college and class sessions can be made from anywhere in the world. VCs provide the student with time for independent learning, so course material can be accessed at any time. A VC is asynchronous, so a student is able to access and respond to material and interact at their own pace. VCs facilitate a diverse range of students and is an effective forum that allows collaboration between students and teacher. The teacher is not confined to a specific classroom and can teach anywhere. Any changes a teacher makes to class material is instantly updated and available to an entire class.

Primary Area: Educational
Secondary Area: Multimedia
Primary OS: Windows
Secondary OS: None
Primary Technology: Java
Secondary Technology: None
Requirements: Laptop/Own Machine
Title: Jonitor
Name: Matthew Barrington
Programme: Software Engineering

Project No. 44

Jonitor is a distributed client/server network monitoring application. It provides the user with the ability to monitor a server instance or instances from a single monitoring node, and allows distributed clients to then connect and view the information that the Jonitor Server has collected.

Jonitor provides systems engineers and administrators with the information they need to keep their servers running effectively as well as the ability to quickly diagnose issues if and when they occur.

Jonitor uses Java’s RMI functionality. This allows for easy sharing of the information from the server to as many clients that are connected. Using a distributed system like this means that if a server is slow to respond and several people need to check it, their viewing of the information does not increase the load, as all that needs to be done is to fire up a client instance and see what the server has been seeing.

The Jonitor Client provides a GUI with visual representations of the data being collected, this allows easy viewing of the information. The Jonitor Server provides human readable logs, which can easily be parsed by external programs to provide more in depth, long term data analysis.

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Primary Area: Network Applications
Secondary Area: None
Primary OS: Unix/Linux
Secondary OS: None
Primary Technology: Java
Secondary Technology: None
Requirements: Laptop/Own Machine
Title: Are They Finished
Name: Shane McGrath
Programme: Software Engineering

The name of the project which was undertaken was a self titled project called “Are They Finished?”. The idea was originally one of Mike Scott’s ideas which was taken from his webpage. The project is primarily designed to be used in restaurants, bars and other public places that serve food. With the aid of video cameras placed above each table where food is to be served, the system is able to detect when the customer’s have finished their meals and therefore notify the staff to collect their plates promptly.

The system judges whether a customer has finished their meal with the use of image recognition in conjunction with the cameras. A still image is taken every minute and analysed by the system. If the system sees that the plate is empty, then the customer has finished, or secondly if the customer hasn’t touched their meal in over five minutes the meal is also judged to be finished.

Primary Area: Image/Video Processing
Secondary Area: None
Primary OS: Windows
Secondary OS: None
Primary Technology: Java
Secondary Technology: None
Requirements: Laptop/Own Machine
This project is based on the use of motion sensor technology within a game environment providing real-time audio/visual feedback. The game aims to create a challenging environment in which players have to achieve their goals by working together. The player’s interaction to the game is based on using an Ubisense motion sensor within an environment with motion sensor receptors that will triangulate the player’s positions and relay those to the game world. Players use one of these devices on their person while playing the game.

The game world is displayed on screen allowing players to see how their movements effect the game environment, as well as showing their movements in real-time. Several aspects of the game such as the worlds edges are marked out in real life to allow players to see where they have limits. A real-time interaction between the player and the game environment features into the game creating a challenging gaming experience. One important aspect of the implementation is the human interaction element of this world or environment. The system provides a GUI, allowing the users to view the current state of the environment, as well as a mechanism for user interaction. The game provides a series of levels in which players must solve puzzles by co-operating with each other to gain the required items to progress throughout the game.

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Primary Area: Gaming
Secondary Area: Sensor Technology
Primary OS: Windows
Secondary OS: Unix/Linux
Primary Technology: Python
Secondary Technology: None
Requirements: Laptop/Own Machine
Title: Multi User Document Creation on a Video Wall
Name: Daniel Morrow
Programme: Software Engineering

The multi touch wall is a surface of dimensions 3 meters wide by 1 meter tall, that allows for multiple points of contact at the same time. The aim of the project is to create an interactive collaborative content creation application with some of the limitations of traditional white boards removed. One such limitation of the traditional white board is space. Once content has filled the available space, it must be erased prior to additional content being created. The application removes this limitation by providing a mechanism to group content and move it off screen, that can be retrieved quickly when needed. The application also provides the ability for users to import pdf documents that have been created on different machines and extract their content based on their information needs. Once the users have extracted the content they can combine this content be it images or text into user content structures. The program also provides the ability for users to save the generated content as images so it can be appended to emails or included in other documents.

Primary Area: Other
Secondary Area: None
Primary OS: Unix/Linux
Secondary OS: None
Primary Technology: C/C++
Secondary Technology: None
Requirements: Lab Machine
Title: Fitness and Agility Based Wall-Touch Game
Name: Philip Fox
Programme: Software Engineering

This open-ended and evolutional project allows people to practice, measure and improve their limb-to-eye coordination, motor-neuron response level, agility, and fitness levels. The system consists of both hardware (i.e. a computer that runs the software component, a projector, a modified webcam, an infrared light source, and reflective gloves) and software.

The project can be thought of as follows: A room contains a peerless projector genlocked (i.e. attached) with a modified webcam (i.e. modified to admit only infra-red light), both of which point towards a wall. An infrared light source, pointed towards the wall, illuminates the wall with IR light which is invisible to the naked eye, and the projector and webcam are connected to a computer that runs the Touch Game software. When running, the software instructs the projector to project an image onto a wall at a particular location and wait a set period of time. The webcam captures frames of the projected image and sends them back to the Touch Game software. A participant, wearing the gloves that are covered in reflective material, attempts to touch the projected image on the wall. The reflective material, attached to the back of each glove, reflects IR light back to the webcam. The software analyses the captured webcam frames and determines whether they contain enough IR light in the right position to indicate that the participant has touched the projected image. If the software deems the participant to have successfully touched the image within the time allowed, the participant’s score is incremented, the image removed, and another image is projected to repeat the process. The game ends when a certain time has elapsed, whereupon game statistics are shown to the participant.

Primary Area: Image Processing
Secondary Area: None
Primary OS: Windows XP
Secondary OS: None
Primary Technology: C/C++
Secondary technology: None
Requirements: Need to demonstrate in X140 or X141 (i.e. in a room with a projector and no windows).