Job description and selection criteria

Job title	Post-Doctoral Research Assistant (2 posts)
Division	MPLS
Department	Computer Science
Location	Wolfson Building, Parks Road, Oxford.
Grade and salary	Grade 7: Salary £30,434 - £37,394 p.a.
Hours	Full Time
Contract type	Fixed Term Contract for up to 2 years, with the possibility of extension
Reporting to	Professor Michael Benedikt
Vacancy reference	116777

Introduction

The University

The University of Oxford is a complex and stimulating organisation, which enjoys an international reputation as a world-class centre of excellence in research and teaching. It employs over 10,000 staff and has a student population of over 21,000.

Most staff are directly appointed and managed by one of the University's 130 departments or other units within a highly devolved operational structure - this includes 5,900 'academic-related' staff (postgraduate research, computing, senior library, and administrative staff) and 2,820 'support' staff (including clerical, library, technical, and manual staff). There are also over 1,600 academic staff (professors, readers, lecturers), whose appointments are in the main overseen by a combination of broader divisional and local faculty board/departmental structures. Academics are generally all also employed by one of the 38 constituent colleges of the University as well as by the central University itself.

Our annual income in 2009/10 was £879.8m. Oxford is one of Europe's most innovative and entrepreneurial universities: income from external research contracts exceeds £367m p.a., and more than 60 spin-off companies have been created.

For more information please visit www.ox.ac.uk

MPLS Division

The academic administration of the University is conducted through four divisions (Humanities, Social Sciences, Mathematical, Physical and Life Sciences, and Medical Sciences). The Mathematical, Physical and Life Sciences Division consists of ten constituent departments: the Department of Chemistry, Computing Laboratory, the Department of Earth Sciences, the Department of Engineering Science, the Department of Materials, Mathematical Institute, the Department of Physics, Department of Plant Sciences, Department of Zoology and Statistics. The division provides a framework for interdisciplinary teaching and research. There are also links with the Medical Sciences Division.

For more information please visit: http://www.mpls.ox.ac.uk/

Department of Computer Science

The Department of Computer Science was established in 1957, making it one of the longest-established Computer Science departments in the country. It is one of the UK's leading Computer Science Departments (ranked first in a number of international rankings). The Research Excellence Framework (REF) in December 2014 resulted in 74 members of the Department having 53% of their research activity ranked in the top category of 4* (world-leading). Overall, we received an average of 3.34 across the department (3* being internationally excellent). A significant majority of the Department are active in externally sponsored research, with both government and industrial funding. At present there are 69 members of academic staff and almost 100 research staff.

The Department has close links with government, industry, and other departments within the University. Among the latter are Mathematics, Engineering, Physics, Statistics and a number of life sciences departments. The Department is housed across multiple sites within the University's South Parks Road Science area, facilitating strong collaborative links with research groups and institutes in closely allied areas (including the Oxford Internet Institute and the Oxford e-Research Centre). This is an essentially inter-disciplinary activity which is at present attracting major funding from a number of sources. At present the Department holds over £50m in external research contracts.

Research in the Department is currently managed in seven themes:

- *Programming Languages and Software Engineering* (led by Professor Jeremy Gibbons, and including Professor Jim Davies) works on a wide variety of areas including model-driven development, functional programming, and static analysis;
- *Security* (led by Professor Bill Roscoe) specialises in cybersecurity (Professor Sadie Creese leads a new Cybersecurity Centre), protocol analysis, trusted computing, networking, and human-centred computing;
- *Automated Verification* (led by Professor Marta Kwiatkowska) covers probabilistic and software model checking (Professor Daniel Kroening), time and concurrency (Professor Joel Ouaknine, Professor James Worrell, and Professors Roscoe and Lowe), and hardware (Professor Tom Melham);
- *Computational Biology* (led by Professor David Gavaghan, and including Professors Kevin Burrage, Helen Byrne, and Blanca Rodriguez) is one of the world's leading

groups building computational models of biological systems, and is particularly well-known for its work on the heart;

- *Foundations, Logic and Structures*, (leader Professor Samson Abramsky) which includes groups working on quantum information and computation (Professors Samson Abramsky and Bob Coecke), game semantics and verification (Professor Luke Ong), and constraints (Professor Peter Jeavons);

- *Information Systems* (led by Professor Ian Horrocks, and including Professors Michael Benedikt, Nando de Freitas, Boris Motik, and Michael Wooldridge) has groups working on databases, knowledge representation and reasoning, multi-agent systems, and computational linguistics (Professor Stephen Pulman);

- *Algorithms* (led by Professor Leslie Ann Goldberg, and including Professors Paul Goldberg and Elias Koutsoupias) covering computational complexity, algorithmic game theory, and constraint satisfaction.

For more information please visit: http://www.cs.ox.ac.uk/

Summary of the University's Equal Opportunities Policy

The policy and practice of the University of Oxford require that all staff are afforded equal opportunities within employment. Entry into employment with the University and progression within employment will be determined only by personal merit and the application of criteria which are related to the duties of each particular post and the relevant salary structure. In all cases, ability to perform the job will be the primary consideration. Subject to statutory provisions, no applicant or member of staff will be treated less favourably than another because of age, disability, gender reassignment, marriage or civil partnership, pregnancy or maternity, race, religion or belief, sex, or sexual orientation.

Job description

Research topic	Proof-driven Query Planning
Principal Investigator / supervisor	Professor Michael Benedikt
Funding partner	EPSRC

Overview of the role

The Department of Computer Science has a vacancy for a Research Assistant to work with Prof. Michael Benedikt on query planning over datasources with diverse interfaces in the presence of integrity constraints. The goal of the project is to create a unified platform for generating query plans, which can work both in a centralized database setting, on top of a database manager, or federating many datasources with diverse interfaces (e.g. flat files, XML documents, web services, web forms). The project will look at creating plans making use of integrity constraints, where these can be as simple as keys/foreign keys relationships or as complex as general first-order logic sentences.

The project lies at the intersection of computational logic and database systems. The logical component revolves upon reducing query plan exploration to proof search. In the setting of restricted "database-style" constraints, this revolves around plan-generation algorithms

based on "The Chase", while for more general constraint systems it involves interpolation. The database component includes tailoring a query optimization system to the presence of access restrictions and integrity constraints.

Main Duties and Responsibilities

The postdoctoral assistant will work with principal investigator Prof. Michael Benedikt in one or more of the following activities:

- Developing and analysing techniques for generating plans from proofs. This will include the development and investigation of proof systems, interpolation algorithms, and definability results for converting from implicit to explicit definitions.
- Development and tuning of reasoning systems for reasoning with database queries
- Creation of constraint-aware query optimization modules, both for existing relational database systems and as middleware.
- Application of the tool suite to a variety of data integration scenarios, including extensive experimental evaluation.
- Manage own academic research and administrative activities. This involves small scale project management, to co-ordinate multiple aspects of work to meet deadlines
- Adapt existing and develop new research methodologies and materials
- Prepare working theories and analyse qualitative and/or quantitative data from a variety of sources, reviewing and refining theories as appropriate
- Contribute ideas for new research projects
- Develop ideas for generating research income, and present detailed research proposals to senior researchers
- Collaborate in the preparation of research publications, and book chapters
- Present papers at conferences or public meetings
- Act as a source of information and advice to other members of the group on methodologies or procedures
- Represent the research group at external meetings/seminars, either with other members of the group or alone
- Carry out collaborative projects with colleagues in partner institutions, and research groups

Selection criteria

Applicants will be judged against the following selection criteria.

Essential:

- A doctorate in computer science or a related discipline (obtained already, or about to be obtained).
- Ability to manage own academic research and associated activities
- A research record in one or more of the areas of: database management; database theory, computational logic (e.g. theorem proving).
- Programming experience, preferably in Java or C++. For a candidate working in database systems, extensive programming and experimental experience will be required.
- Previous experience of giving technical presentations and contributing to the preparation of reports/papers for publication.
- A willingness to collaborate with others and work effectively as a member of a multidisciplinary team/environments.
- Ability to contribute ideas for new research projects and research income generation

- Excellent communication skills, including the ability to write for publication, present research proposals and results, and represent the research group at meetings

Desirable:

- Postdoctoral experience
- Experience of independently managing a discrete area of a research project
- Experience of actively collaborating in the development of research articles for publication

Working at the University of Oxford

For further information about working at Oxford, please see:

http://www.ox.ac.uk/about_the_university/jobs/research/

Salary and Benefits

The posts, which are full time appointments, are available for up to 2 years (with the possibility of extension), have a salary on the University grade 07S scale (currently £30,434 to £37,394), include membership of the University Superannuation Scheme (USS) and have an annual leave entitlement of 38 days per year (inclusive of all public holidays and university closed periods).

How to apply

If you consider that you meet the selection criteria, click on the **Apply Now** button on the 'Job Details' page and follow the on-screen instructions to register as a user. You will then be required to complete a number of screens with your application details, relating to your skills and experience. When prompted, please provide details of **three referees** and indicate whether we can contact them at this stage. You will also be required to upload a CV and supporting statement. The supporting statement should describe what you have been doing over at least the last 10 years. This may have been employment, education, or you may have taken time away from these activities in order to raise a family, care for a dependant, or travel for example. Your application will be judged solely on the basis of how you demonstrate that that you meet the selection criteria outlined above and we are happy to consider evidence of transferable skills or experience which you may have gained outside the context of paid employment or education.

Please save all uploaded documents to show your name and the document type.

All applications must be received by **midday** on the closing date stated in the online advertisement.

Candidates must also ask *three referees* to consider these further particulars and email their reference directly to **job15@cs.ox.ac.uk** or, alternatively, post it to The Administrator, Department of Computer Science, University of Oxford, Wolfson Building, Parks Road, Oxford OX1 3QD, such that the reference arrives by, or shortly after, the closing date.

Referees will not be contacted automatically by the department – the candidate is responsible for having referees send the relevant information in a timely manner.

Should you experience any difficulties using the online application system, please email recruitment.support@admin.ox.ac.uk

To return to the online application at any stage, please click on the following link www.recruit.ox.ac.uk

Please note that you will be notified of the progress of your application by automatic e-mails from our e-recruitment system. **Please check your spam/junk mail** regularly to ensure that you receive all e-mails.