



Job Description - JD088 v5.6

Role Title	Research Software Developer
Department/section	<ul style="list-style-type: none">• Research Software Development Group• Research IT Services
Base location	UCL Bloomsbury Campus, London
Grade	7
JDO Reference	Technical Specialist / Technical Operations NJ11-69
Reporting to	Senior Research Software Developer, Research Software Development
Direct reports	None
Works closely with	<ul style="list-style-type: none">• Head of Research Software Development Group• Team colleagues• Research teams from across UCL:<ul style="list-style-type: none">– graduate students– research staff– UCL academic leaders in computational and data intensive research• Members of the following organisational units within Information Services Division<ul style="list-style-type: none">– Research Computing Group– Research IT Facilitating Services team (outreach, training, advisory)– Research Data Services Group
Date updated	12th July 2018

Working context

The Information Services Division supports and enhances learning, teaching, research and a range of administrative processes across UCL.

ISD has a recurrent budget of £30m pa and a capital budget of £13m-£20m pa and provides technology related services to over 38,000 students and 11,000 staff at UCL and associated institutions.

Facilities and services provided by ISD include all core data centres, email, desktop, printing, networking and software/hardware purchasing. The Division also supports research computing platforms, e-learning and IT security across UCL. The key administrative systems including HR, Finance and Student Information are provided by ISD, as are website development, support, and creative design.

With some 380 staff, the Division is structured into the **Director's Office, Service Delivery, IT Change and Project Delivery Services, Service Strategy and Improvement, Learning Technology and Media Services, Research IT Services, IT for SLMS, IT for IOE and Humanities, IT for Professional Services.**

Research IT Services and teams in **Learning and Technology and Media Services** focus on the two key missions of the university - research and teaching & learning. They aim to ensure services in these areas are world leading.

Director's Office provides architecture services, strategic management, finance services, staffing support and communications.

Service Delivery provides infrastructure and other technology services such as data centres, networks, server and virtualisation support plus the central IT service desk. In addition, **Service Delivery** also provides application support and enhancement services including database administration.

IT Change and Project Delivery Services (ITCPD) owns the project delivery methodology and is responsible for delivering new and enhanced technology enabled change and services which support UCL's strategic goals.

The **Service Strategy & Improvement Department** is responsible for ensuring that ISD continuously improves and promotes its services and processes, including ITIL. The department coordinates the development of the ISD service strategy and ensures it is aligned across the service portfolio.

IT for SLMS provides local support for users in the School of Life and Medical Sciences (SLMS).

IT for IOE and Humanities provides local support to users in the Institute of Education (IOE) and to departments in the Faculties of Arts & Humanities and Social & Historical Sciences.

IT for Professional Services oversees the provision of technology enabled services to the central divisions such as Finance and HR.

Job purpose

- Research Software Developers work with UCL researchers to build and maintain readable, reliable and efficient research software.
- They collaborate with research colleagues from across UCL to construct, improve, and maintain codes used for modelling, analysis and simulation in UCL research.
- They are required to rapidly assimilate research context through publications and conversation with research groups, understand the computational algorithms, requirements and interfaces needed within the research effort, and construct high-quality software for research colleagues which will result in a sustained impact on their research programme.
- They work to improve reliability and performance for parallel codes, while maintaining readability and structure, on UCL's High Performance Computing (HPC) platforms, and other external facilities to which UCL researchers have access, including national supercomputing facilities such as ARCHER.

- They teach UCL research staff and students the effective use of software for research, through leading hands-on training sessions covering topics in programming and software engineering best practice.
- They provide consulting on software practices, techniques, design, and architecture to research groups, helping to build well-structured and maintainable research software.
- They continually study new and existing technologies, tools and ideas in research computing, maintaining expertise in many areas of computational research.
- They build and maintain relationships within the research and e-Infrastructure communities in UCL and beyond, seeking opportunities to contribute to research, and to generate and prepare opportunities for new research projects and funding.
- They contribute to the wider ecosystem of support for computational research in UCL, working with departmental and group colleagues, departmental IT staff and other ISD colleagues to help build integrated systems and services which meet the needs of researchers.
- They maintain and support the state-of-the-art infrastructure and services needed for effective research software engineering, including continuous integration, version control, and code review.
- They support release and dissemination of UCL research software, through open source, scholarly, and commercial channels, ensuring codes are easy to deploy and install.
- They explain and document the software they help create, contributing to research publications and code documentation, and user support for codes they create and maintain.

Main accountabilities and tasks

- The table below summarises the main tasks undertaken for this role.

Accountabilities	Key tasks	% time spent
Research programming	<ul style="list-style-type: none"> • Collaborate with research colleagues from across UCL to construct, improve, and maintain codes used for modelling, analysis and simulation in UCL research. • Lead on the delivery of collaborative research programming projects, organising meetings, and scheduling own work. • Rapidly assimilate research context and understand the computational algorithms, requirements and interfaces involved in a research programming project. • Design and construct high-quality software for research colleagues which will result in a sustained impact on their research programme(s). 	40

	<ul style="list-style-type: none"> • Improve reliability and performance for parallel codes, while maintaining readability and structure, on UCL-owned and other High Performance Computing platforms. • Assist colleagues in analysis and problem-solving tasks, sharing knowledge and expertise with team members. 	
Provide training relating to research software engineering	<ul style="list-style-type: none"> • Train UCL research staff and students in the effective use of software for research. • Develop training materials in research computing, suitable for a range of audiences with a very variable degree of computational experience. • Advise researchers on software practices, techniques, design, and architecture. 	15
Maintain and enhance research software expertise	<ul style="list-style-type: none"> • Maintain expertise in many areas of computational research through both independent study and training courses. • Practice and enhance research programming skills by contributing to relevant open source projects. 	10
Publish, document and support use of research software outputs	<ul style="list-style-type: none"> • Support release and dissemination of UCL research software, through open source, scholarly, and commercial channels. • Explain and document software created with the team's involvement, contributing to research papers, published in the academic literature, project reports and case studies, and code documentation and manuals. • Provide online and face-to-face user support for software they create or maintain to both UCL and external users. 	10
Engage with and contribute to wider research software community	<ul style="list-style-type: none"> • Build and maintain relationships within the research and e-Infrastructure communities in UCL and beyond, actively seeking opportunities for collaboration with researchers including programming and grant preparation. • Contribute to community activities such as seminars and networking events. • Seek out and develop opportunities for new research projects and funding. • Attend conferences and community events in a variety of software engineering/research computing fields in the UK and abroad. 	10

	<ul style="list-style-type: none"> Contribute ideas, experience and thinking to technical working groups in and beyond UCL. 	
Maintain and support research software development infrastructure and services	<ul style="list-style-type: none"> Maintain and support the state-of-the-art infrastructure and services needed for effective research software engineering, in areas such as continuous integration, version control, and code review. Maintain and manage systems and servers used to deliver software development infrastructure services. Author and maintain documentation relating to software development infrastructure services. 	10
Contribute to departmental and divisional activities	<ul style="list-style-type: none"> Assist Research IT Services colleagues in the delivery of other departmental services. Contribute to the wider ecosystem of support for computational research in UCL, working with departmental IT staff and ISD colleagues to help build and maintain integrated systems and services that meet the needs of researchers. Contribute to wider departmental and divisional activities through discussions and meetings. 	5

Person Specification

Essential

1. Postgraduate degree with a significant computational component.
2. PhD degree in a computationally based field or equivalent professional experience (significant experience programming for Research and Development in an academic or industrial setting).
3. Experience as a researcher or of working closely with researchers and contributing to research through software development.
4. Significant experience of using and developing scientific applications to produce research outputs.
5. Ability to rapidly acquire fluent knowledge of new programming languages, libraries and platforms.
6. Experience of analysing, researching and solving complex programming problems.
7. Experience using Unix-based operating systems and Unix system tools and utilities.
8. Advanced skills in C++, C#, Java or Fortran.
9. Experience with the advanced use of high-level dynamic languages for numerically-intensive research, preferably Python, Julia or R.
10. Advanced knowledge of applied mathematics.
11. Excellent written and verbal communication skills including the ability to effectively present complex or technical information to a range of audiences.

12. Ability to work collaboratively and as part of a team.
13. Ability to work under own initiative.
14. Desire to keep up-to-date and learn about new developments in computational research.
15. Knowledge of and commitment to software development best practise including issue tracking, testing, documentation, version control and continuous integration.
16. Expertise in one or more specialist areas of technical computing from the list below. While no single specialism is essential, candidates must be able to demonstrate completion of significant work using one or more of these technologies:
 - Data science techniques, including use of machine learning libraries.
 - Web development, preferably in one or more of Flask, Django, Scala and Angular 2.
 - Databases, relational and/or NoSQL.
 - Inter-language binding technologies such as Jython, Cython or Swig.
 - Build tools, preferably CMake.
 - DevOps for management of scalable infrastructure: Puppet, Chef, Ansible...
 - Cloud computing, containerisation and virtualisation.
 - Parallel programming with OpenMP and/or MPI.
 - Accelerators: CUDA, OpenACC or OpenCL.
 - Partitioned global address space: UPC or Co-Array Fortran.
 - Parallel debuggers and profilers.
 - Parallel visualisation, high performance image processing, computational geometry.
 - Parallel numerical algorithms and libraries.
 - Map/Reduce, Hadoop, Spark, HDFS.
 - Semantic Web, RDF, OWL, SPARQL.
 - Web technologies for data visualization e.g. D3.js.

Desirable

1. Experience of working in a service oriented environment.
2. Experience designing and/or delivering training courses.
3. Knowledge of agile software development methodologies, such as SCRUM or XP.
4. Experience of technologies supporting software re-use and deployment.
5. Knowledge of and experience with object-oriented design, design patterns and refactoring.

Special working conditions

- None

Conditions of Service

- The normal hours of work are 36.5 hours per week. Occasional evening and weekend working may be required. Reasonable notice will be given and where properly authorised

such work will be recompensed as stated in the terms and conditions. The annual leave entitlement is 27 days per year, plus 6 College closure days, plus public holidays.

Additional Information

- The job description reflects the present requirements of the post, and as duties and responsibilities change/develop, the job description will be reviewed and be subject to amendment in consultation with the post holder. The post holder will carry out any other duties as are within the scope, spirit and purpose of the job as requested by the line manager or Head of Department/Division.
- The post holder will actively follow UCL policies including Equal Opportunities policies and be expected to give consideration within their role as to how they can actively advance equality of opportunity and good relations between people who share a relevant protected characteristic and people who do not share it.
- The post holder will maintain an awareness and observation of Fire and Health and Safety Regulations.
- The post holder must ensure organisational compliance, and conformance with the Data Protection Principles. All data, whether stored electronically or by other means must be processed in accordance with the Data protection Act 1998.