

Job Description

A Research Software Engineer (RSE) has a background in computational science/engineering and is interested in providing this expertise to research groups across domain sciences, engineering, and humanities. The RSE's general focus is to translate the needs of a lab or group into high quality, performant, and sustainable research software that can be easily shared or cited. The RSE also works with research computing to build collaborative environments and tools for research, and to champion best practices for software development at the university. The RSE is highly valued for being a core member of research teams, a contributor to open source, and following best practices and testing computational techniques in new and emerging technologies. A layer of RSEs across a university also provides a sustainable, consistent communication network to better connect historically disparate groups that might be working on similar projects unknowingly.

Responsibilities:

- Consult with labs or groups on demand for software expertise or general assessment
- Lead or co-lead the design and implementation of a research software project or system
- Champion best practices including requirement analysis, design, implementation, testing, deployment, documentation, and maintenance.
- Take notice of higher level problems that many researchers face and create software solutions that might address them.
- Maintain knowledge of current and future software development tools and techniques, programming languages, and (if appropriate) cloud or HPC strategies for scaling.
- Lead collaborations with open source projects or industry to improve open source software on behalf of researchers

Essential Qualifications

- Strong programming skills, particularly in the languages scientific computing applications (e.g. Python, Julia, C/C++, and R).
- Demonstrated success:
 - Consistently using conventional and readable coding style.
 - Performing test-driven development and continuous integration.
 - Writing comprehensive, professional, and well-written documentation.
 - Developing or maintaining reproducible build systems
 - Using version control systems.
 - Working collaboratively on a research team
- Ability to work independently.
- Ability to learn new frameworks, systems, or techniques as needed.
- Ability to communicate effectively
- Experience working in an academic research environment

Preferred Qualifications

- Experience with operations (e.g., DevOps)
- Experience optimizing research software and/or algorithms
- Parallel programming experience
- Experience contributing to open source

Education

Bachelor's degree. A graduate degree or equivalent experience in a research setting is preferred.

The growth of a research software engineer

The following chart is a proposal for levels of a career track for an RSE. It is heavily inspired by this work¹, and makes the assumption that a higher level manager exists alongside the team to manage planning, deadlines, etc.

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<https://experts.illinois.edu/en/publications/research-software-development-amp-management-in-universities-case>

Title	Junior Research Software Engineer (JRSE)	Research Software Engineer (RSE)	Senior Research Software Engineer (sRSE)	Principal Research Software Engineer (pRSE)
Major Function	Develop software and tools to address scientific and other real world problems			
			Lead development activities, mentor groups	
Key Responsibilities	Develop new/existing software, independently or in collaboration with the team in support of project goals. Interact with people across a range of scientific/educational disciplines to create research software. When needed, present the group at meetings, conferences, or other professional venues.			
			Oversee and develop on a number of projects. Steward design, community, and development of significant software bases.	
				Leading, building, and maintaining sustainable communities around one or more code bases. Contributing significantly to funding of development (e.g., grants, industry collaborations, etc.)
Supervision	Senior / Principal RSE		Group manager	
Required training, education, experience	BA/BS in computer science or related field			
	Some course level software development experience	1-3 years software development experience	5+ years software development experience	10+ years software development experience
Preferred experience	Programming in one or more scientific and compiled languages Web development (e.g., server side scripting, client side frameworks, HTML, CSS, JavaScript) Databases (MySQL, Postgres, MariaDB, etc.) Contributions toward research publications Experience in or or more of: machine learning, natural language processing, geospatial data management and programming, computer vision or graphics, HPC environments, cloud computing, open source development, and/or systems administration.			
			Subject matter experience on one or more technologies Ability to create software from scratch Proficient in 3 or more programming languages with an ability to decide best use cases for each.	