

The Research Software Engineer (RSE) - Who is that?

— A perspective from within the community —

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Introduction

The teachingRSE project

Outlook and Conclusion

Introduction

SWC: Getting Scientists to Write Better Code by Making Them More Productive, Wilson, 2006

Many scientists and engineers spend much of their lives writing, debugging, and maintaining software, but only a handful have ever been taught how to do this effectively: after a couple of introductory courses, they are left to rediscover (or reinvent) the rest of programming on their own. The result? Most spend far too much time wrestling with software, instead of doing research, but have no idea how reliable or efficient their programs are.

Software Development in academia

- Software often developed by ad-hoc developers
- Long-term reliability and reusability not of primary concern
- Lack of incentives to do “better” Software Development

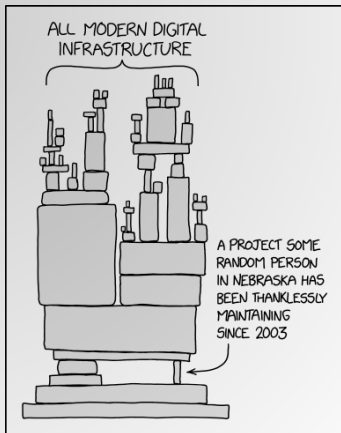


Figure: xkcd, 2347



PURE CODE

Unit tests not included.

Figure: <https://www.laurencegellert.com/2013/05/laurences-list-roadmap-features-to-prioritize/>



Es ging um eine halbe Sekunde

Dieser Deutsche (38) hat das Internet gerettet

Andres Freund entdeckt Hacker-Angriff, jetzt feiert ihn die ganze Welt

Figure: Bild, 05.04.2024

Some history

- 2010: Software Sustainability Institute founded by Univ. of Edinburgh, Southampton, Oxford, and Manchester
- 2012: A collaboration's workshop in oxford
 - Identified numerous career problems for developing software in academia
 - academic software developers need a name: *(R)esearch (S)oftware (E)ngineer*
- 2016: First international conference in Manchester
- 2018: Foundation of de-RSE e.V.
<https://de-rse.org/>
- 2019: international conference deRSE19
- 2023: Special interest group with Gesellschaft für Informatik



**BETTER
SOFTWARE
BETTER
RESEARCH**

Software

Source code, documentation, tests, executables and all other artefacts that are created by humans during the development process that are necessary to understand its purpose.

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Research Software

Foundational algorithms, the software itself, as well as scripts and computational workflows that were created during the research process or for a research purpose, across all domains of research.

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(R)esearch (S)oftware (E)ngineer

People who create or improve research software and/or the structures that the software interacts with in the computational environment of a research domain. They are highly skilled team members who may also choose to conduct their own research as part of their role.

Did it work?

The screenshot displays the LinkedIn search interface. At the top, the search criteria are set to 'research software engineer' in the 'United Kingdom'. Below the search bar, there are filters for 'Jobs', 'Date posted', 'Experience level', 'Salary', 'Company', 'Remote', 'Easy Apply', and 'All filters'. The search results list several job openings, with the top one being 'Senior Research Software Engineer' at The University of Edinburgh. This job is highlighted, and its details are shown in a larger view on the right. The job details include the employer's name, location, and posting date. It is a full-time, mid-senior level position with a salary range of 5,001-10,000 employees. The job description mentions research services and lists skills such as programming and computer science. There are buttons for 'Apply' and 'Save'.

research software engineer in United Kingdom 30 results Set alert

Senior Research Software Engineer

The University of Edinburgh
Edinburgh, Scotland, United Kingdom

3 company alumni work here

Viewed

Research Software Engineer

Newcastle University
Newcastle Upon Tyne, England, United Kingdom (On-site)

5 days ago · **5 applicants** · Easy Apply

Senior Research Software Engineer (Pool) - IT Services - 97324 - Grade 8

University of Birmingham
Birmingham, England, United Kingdom (On-site)

6 company alumni work here

1 month ago · **9 applicants**

Senior Research Software Engineer

Newcastle University
Newcastle, England, United Kingdom (On-site)

4 days ago · **3 applicants**

Senior Software Developer – Signal/Image Processing

Enterprise Recruitment Ltd
Guildford, England, United Kingdom (On-site)

£50K/yr - £70K/yr

5 days ago · **3 applicants** · Easy Apply

Senior Research Software Engineer

The University of Edinburgh · Edinburgh, Scotland, United Kingdom · Reposted 2 weeks ago · 39 applicants

Full-time · Mid-Senior level

5,001-10,000 employees · Research Services

3 company alumni work here · 3 school alumni work here

Skills: Programming, Computer Science, +7 more

See how you compare to 37 applicants. [Try Premium for €0](#)

[Apply](#) [Save](#)

About the job

Job Description

Grade - UE08 £45,585 to £54,395 per annum (A revised salary range for this grade of £48,350 to £59,421 is planned to take effect from Spring 2024)

College of Science & Engineering/School of Physics & Astronomy/Institute for Astronomy

Full-time - 35 hours per week

Fixed-term positions for 2 years.

Start date: 1 May 2024, or soon thereafter

We are looking for two senior research software engineers with experience using cloud infrastructure and orchestration technologies such as OpenStack and

Figure: linkedin, 07.04.24

The teachingRSE project

Where do you get RSEs?

Where do you get RSEs?

- So far researchers that have chosen to focus on a technical role.
- Using developers from outside of academia often has not worked out well.
- Competition from industry.
- How much RSEng do need to go into domain curricula?

The start





















- Community workshop in Paderborn at deRSE23
- We asked questions on:
 - Who would benefit from RSEng?
 - What are essential topics?
 - Are there categories of RSEs?
 - How do we reach users?

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arxiv:2311.11457

Foundational Competencies and Responsibilities of a Research Software Engineer

Florian Goth ¹, Renato Alves ², Matthias Braun ³, Leyla Jael Castro ⁴, Gerasimos Chourdakis ⁵, Simon Christ ⁶, Jeremy Cohen ⁷, Fredo Erxleben ⁸, Jean-Noël Grad ⁹, Magnus Hagdorn ¹⁰, Toby Hodges ¹¹, Guido Juckeland ⁸, Dominic Kempf ¹², Anna-Lena Lamprecht ¹³, Jan Linxweiler ¹⁴, Moritz Schwarzmeier ¹⁵, Heidi Seibold ¹⁶, Jan Philipp Thiele ¹⁷, Harald von Waldow ¹⁸, and Samantha Wittke ¹⁹

Research Skills

- Skills that enable you to work in a research context *and* participate in it.
- Curiosity, (Software) Publication, interacting with domain infrastructure, research cycle, ...

Software/Technical Skills

- Skills that enable you to create good software for your community.
- Software lifecycle, Software behaviour and analysis(Program comprehension), creating software, ...

Communication Skills

- Skills that facilitate effective interaction with people/teams.
- Teaching, project management, end user or stakeholder interaction, ...

→RSEs are RTPs that bring research skills, software skills to good effect in teams.

Dimensions

- Career level
- Project team structures/organisations
- RSE specialization(how much RSE should be taught in standard domain courses)

Specializations

- $\{\text{DOMAIN}\}$ - RSE
- Open Science RSEs
- Project/Community manager RSEs
- Legal-RSEs
- RSE-Teachers
- ...

- The learn and teach project(<https://de-rse.org/learn-and-teach/>) tries to collect curated resources for future RSE courses/curricula.
- The competencies paper is currently being finalised as a position paper of de-RSE e.V.
- A follow-up project on describing how to best set up institutions that support teaching of future RSEs.
- A call-to-action specifically tailored towards changes required in german academia.



Did you know that there is a career track with the job title [Research Software Engineer](#)? Well, if you are not already one, you could **become one!**

You can find here some very good resources on teaching and learning RSE skills. Examples include:

- Which university programs could I attend to study and become a professional RSE?
- Which coherent online courses could I follow to build up skills from the set defined in the [RSE Competencies](#)?
- What material can I reuse for teaching my students about RSE skills?

We aim for original and extensive resources, targeting both general-purpose RSEs, as well as RSE specializations.

How to contribute?

See the [contribution guidelines](#), or [open an issue](#).

Outlook and Conclusion

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- First graduates of dedicated RSE courses -> RSE master's graduates?
- dedicated teaching institutions for RSE's, especially graduated RSEs

Interested in RSEng?

- de-RSE e.V.: <https://de-rse.org/>
- International society for research software:
<https://researchsoftware.org/>
- Find a local chapter: <https://de-rse.org/chapter/>

Interested in joining the teachingRSE Project?

- our github <https://github.com/DE-RSE/learn-and-teach>
- our ML:
<https://lists.uni-wuerzburg.de/mailman/listinfo/teachingrse>
- get the details of our weekly meetings

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Thank You for your Attention!