Associate Research Software Engineer/Research Software Engineer/Senior Research Software Engineer with the National Center for Supercomputing Applications –
Prescreening Questions

1. **How did you learn about this position?**

   I learned about this position while searching for job openings on the University of Illinois Urbana-Champaign career web portal.

2. **What interests you about the role of Research Software Engineer at NCSA?**

   In general terms, what interests me most about the role of Research Software Engineer is the possibility of developing software in an academic environment, especially in an institution with the history and prestige of NCSA. Particularly, I am interested in getting involved in transformative projects where I can contribute with my previous experience and academic background, for example in areas such as humanities, astronomy, or biology.

   On the other hand, I am motivated by the research component of this position. Having the possibility of approaching a problem and trying to solve it with technology, but understanding its fundamentals and dimensions through research seems to me a motivating challenge. At the same time, the possibility of communicating the results and findings of any research, or software creation process, is very attractive to me.

   Finally, and on a very personal note, I am interested in this position because of the possibility of settling into the peaceful, yet energetic, Urbana-Champaign community.

3. **Go into detail about your software development and programming experiences, explaining how these are relevant to the position. When discussing team projects, please clarify what your contributions were to the final product as opposed to those of other team members.**

   To better answer this question, I will review the most relevant job positions I have held in the last time, related to the Research Software Engineer role.

   i. *Data Analyst intern at the United Nations Development Programme (UNDP)*

      In this position I was able to work in data analysis using Python (pandas, numpy, json, among others), as well as collaborating in data visualization using D3.js and Tableau. In terms of teamwork, my main mission had to do with the extraction, transformation and loading of data that would later be used by my counterparts for the generation of visualizations.

   ii. *Research Software Engineer intern at Yale University*

      I was part of a team working for an NGO born at Yale University. Here I also had specific tasks that complemented the work of the rest of the team. My main jobs were developing back-end services in Python (django) that would provide the necessary data to be used in the front-end, developing predictive models using linear regressions that would be implemented in the back-end to generate new data using existing data and researching on the implementation of natural language processing techniques in Python to implement conversational chat bots. Another of my main tasks was to create databases, as well as to perform data extraction and transformation processes.

   iii. *Sofware Engineer at LawLogix (an Equifax Company)*

      Here I was part of a team working with a Software-as-a-Service (SaaS) platform to support immigration processes in the United States. The work was shared within the development team using SCRUM as an agile methodology, and our manager did the load balancing so that all developers completed a similar amount of points during each sprint. My main job was to implement new features, or fix bugs, using JavaScript, HTML, CSS and Angular. We also had to ensure the correct functioning

of the back-end where the data used by the system originated; for this task we used Postgres databases and an intermediate management layer programmed in 4D. I would like to highlight the project where we created an extension for Google Chrome that allowed our users to fill out a DS-160 form just by clicking buttons, making use of existing information in our databases, reducing the filling time by more than 90%.

iv. *Universidad de Talca*

Here my main job was to manage a work team for the implementation of an educational public policy, but data needs emerged that motivated me to develop a web-based information management system to record data derived from the process of academic and psychological support to disadvantaged first year students. Here my main role was to design the application by defining the data models, use cases and design aspects, as well as evaluating and defining the best available technologies for its implementation. Additionally, I had to form a development team and supervise the implementation of the application, using an agile methodology with two-week sprints. Finally, I had to lead the testing process of the platform and then lead the work of promoting it within the university community. The main achievement is that our application, which began with a focused use, ended up being the university's standard for recording information on the academic performance of students under some form of support.

4. What strengths do you believe you could bring to the position that would set you apart from any other applicants?

Apart from the technical skills inherent to software engineering, I consider that the main strength that makes me stand out from other candidates is my broader academic background and my previous experiences. On the one hand, besides being an engineer, I have a background as a journalist with specialization in strategic communications, which makes it easier for me to communicate and generate informative material for the dissemination of scientific work, oriented to different audiences. On the other hand, I

am about to finish my Master of Science in Computational Analysis at the University of Chicago, which has allowed me to develop tools particularly useful in the scientific world such as statistics for data analysis, machine learning concepts, and notions of parallel and distributed programming. I also highlight my previous work experience in public universities, which allowed me to learn how to operate and navigate in an environment similar to that of the University of Illinois Urbana-Champaign.

5. **Write a program in any programming language to do the following:**
    a. **Replace all the vowels in the string "National Center for Supercomputing Applications" by their corresponding order number in alphabetical sequence (a with 1, e with 5, etc).**
    b. **Print the resulting string.**
    c. **Print the total number of consonants in the given string.**

To answer this question, I have chosen to work primarily on Python, and I have created a GitHub public repository[1] where you can find three different solutions. Below I will specify the file's name and a functionality description.

i. **vowels.py**: This is a functional Python solution that addresses exactly what is requested on this question.

ii. **vowels_extended.py**: This is an extension of the previous code, but this time it allows the user to continue interacting with the program through the terminal by entering their own phrases or words. It implements a simple menu, input validation and also for each word that is processed it creates an entry in an external JSON file where it stores the following data: string entered, string length, number of vowels in the string, number of consonants in the string, a timestamp of the last time that string was used and how many times it has been used.

iii. **web:** This is a folder with an *index.html* file and a subfolder inside (*src*). This is a web implementation of the above using JavaScript. Inside the *src* folder you can find *vowels.js* and *vowels.css*, which implements the logic and the style

[1] https://github.com/baltierra/uiucNCSA

respectively. The idea is the same, the simple web application[2] offers a text field, a submit and a clear button, so the user can enter words or sentences and those are processed in the background and an answer is returned to the web page.

6. **Describe any extent of your front-end experience.**

   In terms of front-end experience, I have a proficient command of HTML, CSS, JavaScript and Bootstrap, being able to create interactive web sites (MVC applications) that communicate with a database through an API. On the other hand, I have intensive experience in data visualization in web environments, using the D3.js library. I can also develop websites in conceptual terms by handling design notions and using my background in UI/UX, being able to layout websites and create prototypes using Figma. Finally, and regarding the use of modern frameworks, I have worked with Angular, and I feel comfortable developing simple applications in React.

7. **What are your minimum salary expectations?**

   My minimum gross salary expectation for this position is $85,000 annually.

8. **When would you be available to start working?**

   My earliest availability to start working in this position is June 18, 2023.

9. **What are your expectations regarding in-person vs. hybrid vs. remote work?**

   Personally, I prefer a hybrid work system where flexibility is at the core. Since I live in Urbana, it is not complex for me to comply with a fully on-site work modality when necessary; but if there is the flexibility to alternate that with days of work at home, it seems to me the ideal combination.

10. **Will you require employment authorization sponsorship now or in the future?**

    No.

[2] https://baltierra.dev/vowels/