

## Regulatory Engineering Intern - Challenge Questions

Thank you for your interest in being part of the Kepler team! This next part of the interview process will be a technical screening to assessment of your competency in an area related to this position.

Please answer all of the following questions with a maximum of a 2-page response. The deadline for your response is 7 calendar days from the time at which you received this Challenge Question.

- 1) You are Chief Troubleshooter at a SAAS company called Bloop. Your service has a built-in feedback form that users can fill out to submit bugs or suggestions to the Bloop team. You must manage the timely influx and resolution of these user submissions. Design an SQL database structure that will account for all of the information you think you might need to handle such a task. Provide the tables, fields, and relationships for your database. As Chief Troubleshooter, what are some common queries that you might employ? Provide the full SQL code for one such SQL query.

Bloop's user base is old-fashioned; 70% of the feedback forms you receive are mailed in by paper envelope. How do you account for this in the management of your database?

If you like, you may refine what the Bloop service does to help develop your thoughts.

- 2) You are Chief Pointer at the Big Ol' Radioastronomical Imaging Station (goes by "Boris") in Timbuktoo, Mali. Boris is a parabolic antenna. As Chief Pointer, you must confirm that transmissions coming from satellites passing through Boris' field of view during an observation window will not interfere with its measurements. A group of astronomers request an observation window next Saturday at a certain spot within the Aries constellation. You check your Big Ol' Space Database and find that there will be 20 different satellites that will pass through Boris' field of view during the measurement.

Describe what needs to be considered to determine if any of the passing satellites will interfere with Boris.

Assume that at least one of the satellites has the potential to interfere with Boris' measurements. Create example antenna parameters for Boris and the interfering satellite and show a calculation quantifying the level of interference.

- 3) Provide an executable code that is well commented using the Python library Skyfield (<https://rhodesmill.org/skyfield/api.html#id8>). This code should be able to plot the two-dimensional trajectory in latitude and longitude of any choice satellite over a 24-hour period on a flattened Earth image.

**Bonus** but not required, assess the computation and memory complexity of the SGP4 propagator in big-O notation.