Practice technical questions

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This document contains questions to test knowledge on subject areas relevant to software, data and ML Ops engineering.

Got to Section 1 for a list of resources to use to test logic, brainteasers and coding questions.

Contents

1 Practical questions

These are some references for practical problems to work through. Aim to spent 80% of interview prep time working on practical problems described in the references below.

- [Cra21] is a good reference for brainteasers, logic problems and statistical questions.

- Use [McD19] as a reference for software engineering problems as well as for general interview prep.

Recommended way of working:

1. Review question answers from the day before and double check them.
2. Iterate over questions from a given problem domain.
3. Log the problem domain, questions passed and failed.
4. Iterate over problem domains but do always review the failed questions from the previous session. Practice recall is the name of the game.

2 Software engineering

2.1 Management

1. What does **agile** mean in the context of software development?
2. (4 points) What are lean management practices?
3. (4 points) What are the components of Lean Product Management?
4. (6 points) What are common factors that lead to burnout?
5. (5 points) How can you reduce or fight burnout?
6. What factors can you use to select software?

2.2 Principles

1. (2 points) How can you classify tests?
2. (5 points) What is a unit test? What are some properties of unit testing?

3 ML and ML Ops

1. What are the key distance metrics you can use when comparing vectors?
2. What is one system for incrementally classifying the maturity of different ML/AI integrations?

4 Data engineering

4.1 Principles and concepts

1. What are the differences between a column orientated database (DBMS) and a row orientated database?
2. What are the differences between a relational and document databases?

3. What properties does an ACID transaction have?
4. What are the differences between an OLTP and an OLAP system?
5. How should you evaluate which storage abstraction should be used?
6. What is a data warehouse?
7. What is a data lake?
8. What is a data lakehouse?

4.2 Tooling

1. (1 point) What is docker?
2. (2 points) What is a distroless image?
4. (1 point) What is terraform?

5 Python

Questions on Python programming all the way to niche Python behaviour.

5.1 General knowledge

1. Can you hash a set?
2. What is monkey patching?
3. How does Python work under the hood?
4. What are Python decorators?
5. What is the difference between a list and a tuple?
6. What is the Global Interpreter Lock?
7. What is the difference between range and xrange?
8. What is a generator and why is it useful?
9. (4 points) Describe the different types of inheritance.
10. (3 points) What is a deep copy and what is a shallow copy and when is the difference relevant?
11. (2 points) What problems can exist with deep copy operations that don't exist with shallow copy operations?
12. (2 points) What are local and global namespaces?
13. What is the difference between a module and a package?
14. What are abstract base classes and why are they useful?

References for these questions include my head, actual interview questions and [Hac23].

5.2 Pandas

1. What types of merge exist and how are they used?

6 SQL

1. What types of join exist and how are they used?

7 Maths

7.1 Useful algorithms

1. Write a function to convert an arabic number to roman numerals.

7.2 Big O notation

https://github.com/Devinterview-io/big-o-notation-interview-questions

7.3 Useful numbers

https://www.techinterviewhandbook.org/algorithms/math/
Double check cracking the coding interview.

References

[NK18] Jez Humble Nicole Forsgren and Gene Kim. *Accelerate: Building and Scaling High Performing Technology Organiztions*. 1st ed. IT Revolution, 2018.

[Kle19] Martin Kleppmann. *Designing Data-Intensive Applications*. 7th ed. O'Reilly, 2019.

[McD19] Gayle Laakmann McDowell. *Cracking the Coding Interview*. 6th ed. CareerCup, 2019.

[TW20] Tom Manshreck Titus Winters and Hyrum Wright. *Software Engineering at Google*. 1st ed. O'Reilly, 2020.

[Cra21] Timothy Falcon Crack. *Heard on The Street: Quantitative Questions from Wall Street Job Interviews*. 22nd ed. O'Reilly, 2021.

[RH22] Joe Reiss and Matt Housley. *Fundamentals of Data Engineering*. 1st ed. O'Reilly, 2022.

[Hac23] Hackr.IO. *Python Interview Questions*. 2023. URL: https://hackr.io/blog/python-interview-questions.

[] *Technology readiness levels for machine learning systems - Nature Communications — nature.com*. https://www.nature.com/articles/s41467-022-33128-9. [Accessed 05-06-2024].