# Amazon Data Engineer Interview Guide - Experienced

## Introduction

As a data engineer at Amazon, you'd be responsible for building and maintaining the framework that facilitates data gathering, retention, and examination for their specific team or business unit. They design large-scale data solutions with the goal of making the company's complex data accessible in the most efficient way possible, so that the rest of the organization can use it to evaluate and improve their products, features, and services.

As an Amazon/AWS data engineer, you could join various teams including Consumer Technology, Human Resources Technology, Operations Technology, AWS Databases, Analytics and AI/ML Products and Services, Infrastructure Operations, etc. Each business unit will have diverse and high volume of data that their DEs need to deal with on a regular basis.

Aside from working with huge datasets and building scalable data solutions, Amazon DEs are expected to work with cross-functional teams and stakeholders.

## What skills are required for the Amazon Data Engineer role?

The minimum requirement you'd need to qualify for an Amazon/AWS data engineer role is at least 3+ years of data engineering experience, experience with data modeling, warehousing and building ETL pipelines, and SQL experience. You'll find that some openings require having a bachelor's degree in any technical or quantitative field such as computer science, engineering, analytics, mathematics, statistics, IT or equivalent. If you have a master's degree, even better, but it's not required.

Experience with AWS technologies like Redshift, S3, AWS Glue, EMR, Kinesis, FireHose, Lambda, and IAM roles and permissions as well as with non-relational databases/data stores, will make you stand out as a DE candidate at Amazon/AWS.

As for programming language, you'll need to be proficient in at least one, like Python, Ruby, Java, or similar.

Different job postings will have even more unique requirements, so it's important to read through each to find a position that matches your background and interests.

### Career Levels and Compensation

Amazon India data engineer: est. average total pay $22.7k

Amazon US data engineer: est. average total pay $193k

## Amazon Data Engineer Salary & Compensation

| Level | Base Salary | Total Compensation |
|---|---|---|
| Data Engineer (L4) | $108,000 | $143,000 |
| Data Engineer (L5) | $139,000 | $192,000 |
| Data Engineer (L6) | $145,000 | $255,000 |

## Interview Process Overview

- Resume screen
- Technical phone screen (1-2 calls, 75 min each)
- Interview loop (5 interviews, 55 min each)

## Detailed Breakdown of Each Round

### 1. Resume Screening

The resume screen is the most competitive phase, as recruiters sift through countless applications to identify candidates whose experiences align with the role.
Here's what recruiters typically look for:

- **Relevant experience**: Projects or roles showcasing strong data engineering skills, including expertise in SQL, ETL pipelines, and data modeling.

- **Quantifiable achievements**: Highlighting impactful results, such as improving system performance or building scalable data solutions.

- **Alignment with Amazon's scale**: Evidence of handling large datasets, automation, or cloud tools like AWS.

**Tips for Standing Out:**

- **Tailor your resume**: Emphasize skills and experiences relevant to the job description. Use action verbs and quantify results where possible.

- **Get a referral**: If you know someone at Amazon, a referral can improve your chances of making it past this stage.

## 2. Technical Phone Screen

If your resume is shortlisted, the next step is one or two technical phone screens, each lasting about 75 minutes. These are designed to test both technical and behavioral skills.

**What to Expect:**

1. **Technical Assessment**:

   - SQL Proficiency: Writing and optimizing complex queries. Expect tasks involving joins, aggregations, and window functions.

   - Scripting Knowledge: Basic R or Python scripting, especially for automation or data transformation.

   - Data Visualization: Discussion of projects involving tools like Tableau or Power BI and building dashboards to track metrics.

   - Database Concepts: Understanding relational and non-relational databases, as well as OLAP systems.

Note: During the SQL assessment, you'll be required to share your screen while solving problems.

1. **Problem-Solving and Analytical Thinking**:

   - Interviewers assess how you approach ambiguous situations and engage with cross-functional teams.

   - Questions may explore statistical reasoning and decision-making processes.

2. **Amazon Leadership Principles (LPs)**:

   - These are integral to every step of Amazon's hiring process. Expect questions tied to LPs like Ownership, Bias for Action, and Customer Obsession.

**Preparation Tips:**

- **Master SQL**: Practice solving queries on platforms like LeetCode or HackerRank. Focus on performance optimization.
- **Understand the LPs**: Be ready to share real-life examples demonstrating behaviors that align with Amazon's principles.
- **Brush up on analytics tools**: Familiarize yourself with tools like Tableau and the basics of scripting in Python or R.

## 3. Interview Loop

After passing the phone screens, you'll be invited to the **interview loop**, Amazon's most intensive interview phase. This includes five back-to-back interviews, each lasting up to 55 minutes.

**Key Features:**

- **Diverse Interviewers**: Your panel will include data engineers, software engineers, hiring managers, and a Bar Raiser.

- **Bar Raiser**: A trained Amazon employee unaffiliated with the hiring team. Their primary role is to ensure Amazon maintains its high hiring standards.

- **Focus on Behavioural and Technical Skills**:

    - Expect a higher emphasis on behavioural questions compared to other tech companies.

    - Each interviewer will evaluate you on 2-3 Leadership Principles.

**What to Prepare For:**

- **Behavioural Questions**: Amazon's LP-focused questions require you to demonstrate past experiences where you exhibited specific qualities (e.g., solving conflicts, leading initiatives).

- **Technical Topics**: SQL, data architecture, data modeling, and problem-solving are common areas of focus.

**Pro Tips for Success:**

- **STAR Framework**: Structure your answers using the Situation, Task, Action, Result format for clarity and impact.

- **Understand the Role**: Research the team's focus and tailor your responses to highlight relevant skills.

# The Amazon Interview Evaluation

At the end of each interview, your performance is documented and graded using a standardized feedback form. This ensures that every candidate is evaluated against the same core criteria, creating a fair comparison.

## Key Components of the Evaluation

### A) Notes

- **What's Recorded**: The interviewer logs the questions they asked, a summary of your responses, and their impressions.

- **Purpose**: This helps capture the context of your answers, including strengths (e.g., "explained ABC effectively") or areas needing improvement (e.g., "weak understanding of XYZ").

### B) Technical Competencies

- Your technical skills are graded to determine if you "raise the bar." This means proving you are at least as skilled as the average Amazon data engineer at the level you're applying for.

- **Common Competencies for Data Engineers**:

    - Analytical problem-solving
    - Communication and collaboration with cross-functional teams
    - Advanced SQL, data modeling, and warehousing knowledge
    - ETL pipeline development
    - Data visualization using tools like Tableau or Power BI

### C) Leadership Principles (LPs)

- Each interviewer evaluates you against two or three of Amazon's 16 Leadership Principles.

- The goal is to determine if you exemplify the values Amazon prioritizes (e.g., Ownership, Customer Obsession, Bias for Action).

### D) Overall Recommendation

- After grading you on technical and behavioral criteria, the interviewer provides an overall recommendation:

    - "Strong hire"

    - "Hire"

    - "No hire"

    - "Strong no hire"

# What Happens Behind the Scenes

Amazon's hiring process includes several stages of feedback, review, and decision-making, all led by the recruiter. Here's a breakdown of what happens after your interviews:

## 1. After the Technical Phone Screens

- Your recruiter reviews the interview feedback to decide whether you move forward to the interview loop. Strong performance in SQL, problem-solving, and LP alignment is crucial here.

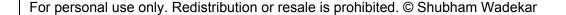## 2. After the Interview Loop

- Each interviewer submits their evaluation into Amazon's internal system. This includes:

    - Notes from the interview.

    - Grades on technical competencies and Leadership Principles.

    - A final recommendation on whether to hire you or not.

## 3. The Debrief

- A debrief session is held, where all interviewers discuss their evaluations. This meeting is led by the Bar Raiser, who:

    - Ensures that the decision-making is fair and aligned with Amazon's standards.
    - Guides the discussion toward a consensus.
    - Has the authority to veto a hire if they believe the candidate does not meet the bar, even if other interviewers are in favor.

## 4. The Offer

- If the group agrees to hire, the recruiter typically reaches out with an offer within a week of the onsite interview. However, delays can occur.

## Amazon Data Engineer Example Questions

Let's get into the primary categories of questions you'll encounter in the Amazon data engineer interview.

Here are the most common question categories based on the questions reported by Amazon DE candidates on Glassdoor.

- Behavioral interview questions
- SQL interview questions
- Data management interview questions
- Data modeling
- Data warehousing
- Data pipelines
- Coding interview questions
- Others: analytical problem-solving, data visualization
- Do note that each Amazon business unit or team will have different technical requirements. Your recruiter should be able to advise you on which aspects to focus on.

## 1. SQL Interview Questions

**Why It Matters:**
Amazon's backend processes billions of data operations daily. Data engineers must demonstrate proficiency in handling vast volumes of structured and unstructured data. SQL assessments are integral to evaluating this ability.

**What to Expect:**
You'll solve problems that mimic real-world scenarios, including:

- Writing efficient SQL queries using window functions, subqueries, joins, and aggregate functions.

- Demonstrating performance tuning and query optimization techniques.

- Applying SQL skills to data modeling and warehousing problems.

**Example SQL Questions:**

1. **Peak Activity:**

   - *Question*: Given a dataset, find the time period when the most people were online, measured in seconds.

   - *Focus*: Time-series analysis, window functions, and efficient query writing.

2. **Employee Data Mining:**

   - *Question*: From a table with columns datetime, employee, and customer_response (free text), extract phone numbers embedded in customer_response and find the top 10 employees associated with the most numbers.

   - *Focus*: String manipulation and ranking techniques.

3. **Sales Trends Analysis:**

   - *Question*: Display all products with more than 50% sales increase from the previous month to the current month.

   - *Focus*: Analytical queries involving percentage calculations and time-based aggregation.

4. **Retention Analysis:**

   - *Question*: Calculate the first-day retention rate for players. Retention is defined as players logging in on the second day after their initial login.

   - *Focus*: Date calculations and user behavior analysis.

5. **Subscriber Campaign Data:**

   - *Question*: Write a query to identify inactive subscribers for a marketing re-engagement campaign.

   - *Focus*: Filtering and conditional logic.

6. **Revenue Calculation:**

   - *Question*: Write a query to get the total revenue generated by each subscriber in 2014.

   - *Focus*: Aggregation and filtering by date ranges.

7. **Performance Troubleshooting:**

   - *Scenario*: Given a specific SQL error or performance degradation, explain the cause and propose fixes.

**Tips for SQL Success:**

- Practice using complex joins, CTEs, and window functions.

- Familiarize yourself with query optimization techniques (e.g., indexing, analyzing execution plans).

- Be comfortable explaining your approach during the interview.

## 2. Data Management Questions

**Why It Matters:**
With its vast datasets, Amazon relies on efficient data modeling, storage, and retrieval solutions. You'll need to design schemas, build pipelines, and solve data warehousing challenges.

### Data Modeling Questions

1. How do you create a schema that tracks customer addresses, including address changes over time?

    - Focus: Temporal data management and normalization.

2. Design a data model to track a product's journey from vendor to warehouse to delivery.

    - Focus: Workflow-based schema design.

3. Should we apply normalization rules to a star schema? Why or why not?

    - Focus: Trade-offs in schema design for analytical workloads.

4. What's a chasm trap? How do you avoid it?

    - Focus: Advanced relational database concepts.

### Data Warehousing Questions

1. Design a data warehouse to capture sales and assist the customer support team with ticket management.

    - Focus: Dimensional modeling and schema design.

2. Provide a schema for an OLAP system tailored for Amazon's retail data.

    - Focus: Analytical query optimization.

### Data Pipeline Questions

1. Given a dataset and increasing data volume, how would you design an ETL pipeline using AWS products?

    - Focus: Scalable pipeline architecture, fault tolerance, and cloud services.

2. Write a script to transform raw logs into a structured format for analytics.

    - Focus: End-to-end ETL design and implementation.

## 3. Coding Interview Questions

**Why It Matters:**
Amazon's data engineers solve key challenges with efficient, scalable code. These questions test your logical thinking, data manipulation skills, and ability to work with data structures.

**What to Expect:**
Most coding questions are in Python, focusing on:

- Data structure manipulation (e.g., dictionaries, lists).

- Algorithmic problem-solving.

- File and data processing.

**Example Coding Questions:**

1. **Odd Number Sorting:**

   - *Question*: Write a function to sort an array, returning only odd numbers.

2. **Unique Values Preservation:**

   - *Question*: Find non-duplicate numbers from a list while preserving the original order. Example: [1,1,3,2,5,6,5] → [1,3,2,5,6].

3. **Maximum Occurrences:**

   - *Question*: Given a list, return the numbers with the highest count.

4. **JSON Flattening:**

   - *Question*: Write a function to flatten nested JSON objects into a single key-value dictionary.

5. **Array Pair Sum:**

   - *Question*: Write code to find two numbers in an array that sum up to x.

6. **Stack Implementation:**

   - *Question*: Implement a stack using a linked list.

## 4. Analytical Problem-Solving and Data Visualization

**Why It Matters:**
Amazon values data-driven insights and clear communication of findings. These questions test your ability to analyze data, create metrics, and visualize trends.

**Key Questions:**

1. How have you used statistics in data analysis? Provide examples.

2. Describe a dashboard or visualization project you've completed. What tools did you use, and how did you define KPIs?

3. What's your approach to building end-to-end dashboards?

**Tools to Know:**

- Tableau, Power BI, AWS QuickSight for visualization.

Python or R for statistical analysis

## 5. Behavioural interview questions

### Customer Obsession interview questions

- **Definition**: Leaders prioritize customers' needs and work backward to enhance their experience. They earn trust and relentlessly focus on delivering value.

- **Why it matters**: Amazon emphasizes customer-centric innovation over competitor analysis, making this the cornerstone of its culture.

- **How to prepare**:

    1. Highlight instances where you prioritized customer needs, even in challenging scenarios.

    2. Share specific examples demonstrating empathy, problem-solving, and customer trust-building.

- **Example Questions**:

    - Tell me about a time you went above and beyond for a customer.

    - How did you handle a challenging customer interaction?

    - Can you share a situation where you simplified a process for customers?

### Ownership interview questions

- **Definition**: Leaders act on behalf of the entire company, not just their own teams. They never say, "That's not my job."

- **Why it matters**: Amazon seeks employees who take initiative, make tough decisions, and take responsibility for their actions.

- **How to prepare**:

    1. Provide examples of taking charge of cross-functional projects.

    2. Showcase how you went beyond your role to solve problems or meet goals.

- **Example Questions**:

    - Describe a time you took ownership of a problem outside your responsibility.

    - Share an instance where you made a long-term decision that wasn't immediately beneficial.

## Bias for Action interview questions

- **Definition**: Leaders value speed, calculated risk-taking, and decision-making over perfection.

- **Why it matters**: Amazon thrives on innovation and quick iterations, learning from results rather than extended research.

- **How to prepare**:

    1. Highlight examples where you made quick yet calculated decisions.

    2. Discuss how you embraced iterative approaches and handled setbacks constructively.

- **Example Questions**:

    - Tell me about a time you took a calculated risk and its outcome.

    - Share an instance where you met a deadline by adjusting your approach.

## Have Backbone; Disagree and Commit interview questions

- **Definition**: Leaders respectfully challenge decisions and commit fully once a resolution is reached.

- **Why it matters**: Amazon values individuals with strong convictions who can balance advocacy with team alignment.

- **How to prepare**:

    1. Provide examples where you constructively disagreed with a decision and its impact.

    2. Show how you respected final decisions and contributed to their success.

- **Example Questions**:

    - Describe a time you disagreed with a team decision and how you handled it.

    - Share an instance where you advocated for an idea against opposition.

## Invent and Simplify interview questions

- **Definition**: Leaders innovate and simplify processes, embracing external ideas and learning from failures.

- **Why it matters**: Amazon's success relies on innovative, scalable solutions that reduce complexity.

- **How to prepare**:

    1. Highlight examples of creative problem-solving and cost-effective innovation.

    2. Showcase solutions that simplified processes while maintaining quality.

- **Example Questions**:
    - Tell me about the most innovative solution you developed.
    - Share a time when you simplified a complex system or process.

## Dive Deep interview questions

- **Definition**: Leaders pay attention to detail, audit frequently, and remain connected to the fundamentals.
- **Why it matters**: Amazon values employees who can identify root causes and solve problems effectively.
- **How to prepare**:
    1. Provide examples of deep analysis leading to critical problem-solving.
    2. Highlight your ability to leverage data and uncover insights quickly.
- **Example Questions**:
    - Share a time you had to perform a deep analysis to solve a complex problem.
    - Describe a situation where metrics and anecdotes didn't align and how you resolved it.

## Are Right, a Lot interview questions

- **Definition**: Leaders use sound judgment, seek diverse perspectives, and make informed decisions despite ambiguity.
- **Why it matters**: Amazon values critical thinkers with a strong track record of accurate decision-making.
- **How to prepare**:
    1. Provide examples where your decision-making led to successful outcomes.
    2. Highlight your approach to resolving ambiguous challenges.
- **Example Questions**:
    - Tell me about a time you made a decision without complete data.
    - Share an instance where your instincts were proven right in a tough situation.

## Strive to Be Earth's Best Employer" Interview Questions

**Principle Overview:**

Leaders work to create an environment where employees feel empowered, productive, and safe. They prioritize diversity, equity, inclusion, and overall well-being while fostering growth and engagement.

For senior and managerial roles, you'll be expected to show how you can create a nurturing, inclusive environment that supports team members in achieving their best, professionally and personally.

**How to Address These Questions?**

- Share examples of initiatives you've led to promote team morale, diversity, and employee satisfaction.

- Demonstrate how you resolve conflicts or address challenges to create a positive workplace culture.

- Highlight your efforts in supporting career growth and well-being for team members.

**Example Questions:**

1. Tell me about a time you went above and beyond for a team member.

2. How have you identified and managed low performers while encouraging career growth for high performers?

3. Describe a time you advocated for an employee's success or well-being in a challenging situation.

4. What initiatives have you taken to promote diversity, equity, or inclusion in your team?

## Success and Scale Bring Broad Responsibility" Interview Questions

**Principle Overview:**
Amazon's influence is vast, and leaders are expected to act with humility and responsibility, mindful of the company's global impact. Decisions should consider long-term effects on communities, the planet, and future generations.

**How to Address These Questions**

- Highlight decisions or projects where you considered environmental, ethical, or community impacts.

- Share how you've adapted to unforeseen secondary consequences of your work and taken steps to address them.

- Emphasize your awareness of scalability and sustainability when implementing solutions.

**Example Questions:**

1. Describe a time you made a decision that had a significant impact on your team or company.

2. Can you share a project where you considered long-term sustainability or ethical impacts?

3. Tell me about a decision you made that you later regretted. How did you handle its consequences?

4. How have you ensured that your projects leave a positive legacy or improve the systems you're a part of?

## Deliver Results Interview Questions

**Principle Overview:**
Leaders focus on delivering quality outcomes on time. Despite setbacks, they consistently prioritize achieving results. This principle emphasizes action over perfection and perseverance in challenging situations.

**How to Address These Questions?**

- Highlight how you have successfully delivered on commitments despite obstacles.

- Emphasize your prioritization skills and ability to balance quality with deadlines.

- Share examples where your efforts positively impacted the team or organization.

**Example Questions:**

1. Tell me about the most challenging project you ever worked on.

2. How do you prioritize competing tasks or responsibilities in your current role?

3. Share examples of past accomplishments and how they influenced your approach to future projects.

4. Describe a time when you missed a deadline. How did you handle it?

## Think Big Interview Questions

**Principle Overview:**
Leaders create bold visions that inspire others and challenge conventional thinking. This principle is about innovation and scaling ideas to make a significant impact.

**How to Address These Questions?**

- Share instances where you proposed ambitious, forward-thinking ideas that succeeded.

- Highlight how you inspired others to adopt your vision or non-traditional approaches to problem-solving.

- Discuss the scalability and long-term impact of your solutions.

**Example Questions:**

1. What is your most significant accomplishment, and why was it important?

2. Describe a time you challenged the status quo to solve a problem creatively.

3. Share an example of a non-intuitive solution you proposed. How did you convince others of its viability?

4. How do you ensure your ideas and initiatives scale effectively?

## Hire and Develop the Best Interview Questions

**Principle Overview:**
Leaders raise the bar with every hire and promotion. They focus on building strong teams, mentoring colleagues, and ensuring individual and organizational growth.

**How to Address These Questions:**

- Showcase examples of how you've identified and nurtured talent within your team.

- Demonstrate your ability to mentor others and elevate team performance.

- Highlight your commitment to hiring and collaborating with talented individuals, even if they surpass your skill level.

**Example Questions:**

1. Tell me about a time you helped a struggling teammate improve their performance.

2. How have you boosted team morale or cohesion in challenging situations?

3. Describe a time you hired or collaborated with someone more skilled than you.

4. What steps have you taken to mentor or develop talent in your organization?

## Frugality Interview Questions

**Principle Overview:**
Accomplish more with fewer resources. This principle emphasizes resourcefulness, efficiency, and innovation under constraints.

**How to Address These Questions:**

- Provide examples of cost-effective solutions or initiatives you've implemented.

- Showcase how constraints have driven you to find creative, efficient ways to deliver results.

- Demonstrate your ability to maximize resources without compromising quality.

**Example Questions:**

1. Describe the last time you simplified an approach to save on expenses.

2. Tell me about a time you delivered a project successfully with limited resources.

3. How do you prioritize investments when working under budget constraints?

## Learn and Be Curious Interview Questions

**Principle Overview:**
Leaders seek to continuously improve themselves and explore new possibilities. This principle emphasizes a growth mindset and adaptability.

**How to Address These Questions:**

- Share examples of self-initiated learning or exploration of new ideas.

- Highlight your ability to teach yourself skills and your curiosity for innovation.

- Discuss how your learning habits have positively impacted your work.

**Example Questions:**

1. What's the most innovative thing you've done in your career?

2. Tell me about a time you taught yourself a new skill.

3. What are your future career or personal development goals?

4. Why did you choose data engineering as your career path?

## Insist on the Highest Standards Interview Questions

**Principle Overview:**
Leaders maintain high standards and ensure that problems are addressed at their root to prevent recurrence. This principle values continuous improvement and excellence.

**How to Address These Questions:**

- Share examples where you identified and addressed gaps in quality or performance.

- Highlight initiatives you led to establish or improve processes and standards.

- Show your commitment to excellence, even when under pressure.

**Example Questions:**

1. Describe a project you wish you had done better. How would you approach it differently today?

2. Tell me about the most successful project you've worked on. What made it successful?

3. How do you ensure high standards are met in your work or team?

4. Share a time when you had to address a colleague's subpar performance.

**Principle Overview:**
Leaders build trust by listening, communicating openly, and treating others with respect. They admit their mistakes and focus on resolving issues rather than assigning blame.

**How to Address These Questions:**

- Provide examples of how you've built trust through communication, transparency, and collaboration.

- Discuss how you've handled criticism or disagreements constructively.

- Emphasize humility and accountability in your responses.

**Example Questions:**

1. Tell me about a time you had a disagreement with a coworker or manager.

2. How do you earn trust with a new team?

3. Describe a piece of difficult feedback you received and how you acted on it.

4. A coworker consistently arrives late to meetings. How would you handle this situation?

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