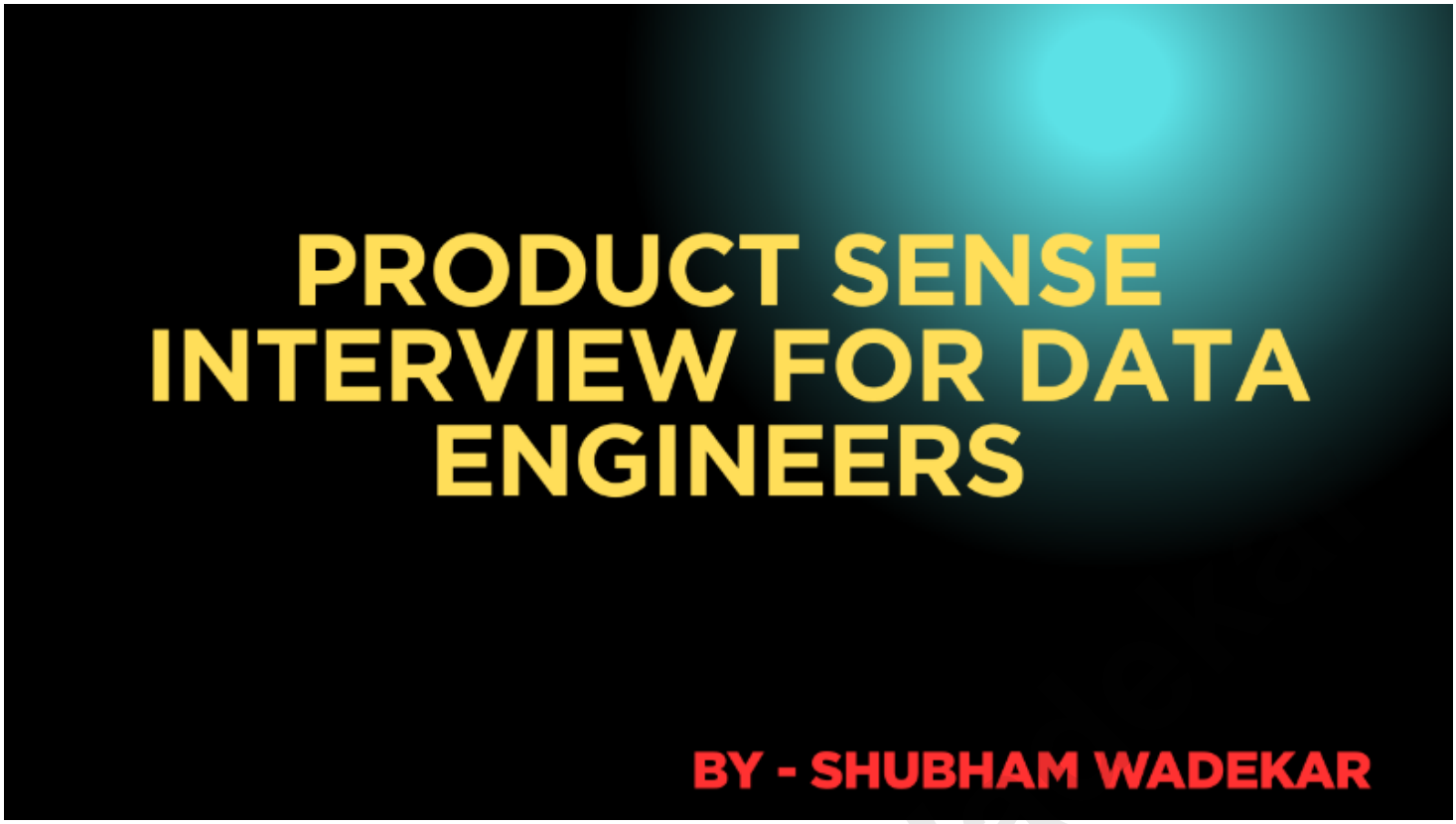


PRODUCT SENSE INTERVIEW FOR DATA ENGINEERS

The product sense interview for a data engineer aims to assess the candidate's ability to understand business objectives, design and interpret metrics, and make data-driven recommendations to improve products or solve specific problems. In this interview, candidates might be presented with a hypothetical or real-life business scenario and asked to identify key performance indicators (KPIs), design experiments, analyze data, and offer insights. The questions are designed to test not just technical skills in data manipulation and analysis, but also the candidate's understanding of how data impacts product decisions and business outcomes. Communication skills are also crucial, as candidates must effectively convey their thought process, rationale, and recommendations. Questions typically fit into one of three categories:

- Given a chart of some data, determine what could be wrong.
- Discuss the business impact for a scenario.
- Discuss how you work with data analysts and data scientists to improve a product.

In this section we will cover the first item, and we will cover the second and third items in separate articles.

Effective communication is critical in the product sense interview, by having a structured process you can make sure the interviewer understands your approach. Before you attempt to solve for the drop, be sure to use these 4steps.

1: Clarify the Problem Statement

Acknowledge the Issue: Start by acknowledging the problem you see in the chart and indicating your understanding of why it's crucial.

2: Describe Your Approach

Lay Out Your Plan. Clearly describe your approach for investigating the issue, breaking it down into manageable steps. Explain your plan to first probe at various dimensions to focus on the problem, and then identify potential factors.

3: Interactive Troubleshooting

Ask Directed Questions: As you start to narrow down potential causes, ask questions that can guide you toward isolating the issue. Focus on the dimension related items we covered previously. For example, "Is this drop observed across all platforms? Is it confined to a particular geographic region?" We will dive deep into this in a moment.

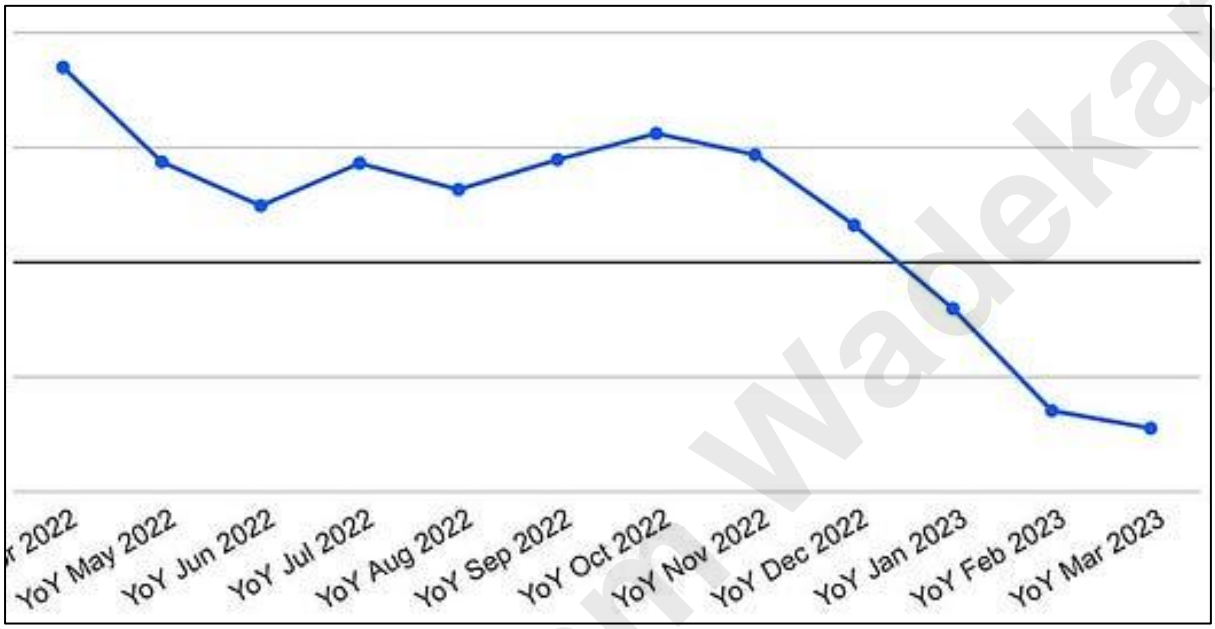
Explain Your Thinking: Continuously explain your thought process as you examine different dimensions and metrics. This helps the interviewer follow along and provides insights into your problem-solving abilities.

4: Discussing Findings

Summarize Observations: Once you've done your analysis, summarize what you've found, even if you haven't fully isolated the issue you can recap what you have eliminated.

Given a chart of some data, determine what could be wrong.

A typical product sense question for a data engineering interview is "Given a chart of some data, determine what could be wrong". You would be presented with an abstract chart such at this:



When faced with a chart showing Monthly Active Users (MAU) for the year with a significant drop in the end, a multi-faceted analysis should be undertaken to diagnose the root cause accurately. Narrowing down the cause of a metric change often involves slicing the data across multiple dimensions or factors to isolate the root of the issue.

You should use a two step framework on this question:

1. Narrow down the dimensions which are most **impacted** by the drop
2. Identify *internal* or *external* factors which could **cause** the drop

Step 1: here are some critical dimensions you might consider investigating:

Platform and Device

- *Operating System*: Is the drop occurring on iOS only, Android only, or both? This can help identify if a platform-specific bug or update is the culprit.
- *Device Type*: Is the drop specific to mobile users, desktop users, or tablet users?

User Demographics

- *Age Groups*: Are certain age brackets showing a more significant decline than others?
- *Gender*: Is one gender more affected than the other?

Geographic Factors

- By *Country/Region*: Is the drop localized to a specific country or region?
- *By City*: Sometimes, even specific cities may show a decline due to localized events or issues.

Time

- *Day of the Week:* Is the drop specific to a particular day(s) of the week?
- *Time of Day*: Does the drop align with specific hours of the day?

User Behavior

- *New vs. Returning Users*: Is the drop more pronounced among new users, returning users, or both?
- *User Segments*: Are power users, casual users, or some other user segment more affected?

Features and Functionality

- *By App Version*: Are users on a specific app version experiencing the decline?
- *By Feature Usage*: Are users who frequently use a particular feature more affected than others?

Marketing and Acquisition Channels

- *Organic vs. Paid Users*: Is the drop more significant in users acquired through paid advertising compared to organic channels?
- *Campaign-Specific:* If you are running multiple marketing campaigns, try to determine if the drop is tied to a particular one.

Additional Metrics

- *Engagement Metrics*: Look into related metrics like session duration, number of actions performed, etc., to provide context to the MAU drop.
- *Error Rates:* Check if there has been an increase in error rates or crashes that correlate with the drop in MAU.

By analyzing these dimensions, you can better isolate the cause of the MAU drop, making it easier to devise a strategy to address the issue.

Step 2: Once you have narrowed down the dimensions, you can focus your efforts by categorizing potential factors into internal and external buckets can help organize the approach for diagnosing a sudden drop in Monthly Active Users (MAU).

Internal Factors:

- *Technical Issues*: Verify if there were system outages, bugs, or performance issues that might have affected user access or experience.
- *Data Integrity:* Confirm that the data collection, pipelines, and analytics tools are functioning correctly to ensure the MAU drop is not a reporting error.
- *Product Changes:* Scrutinize any recent updates, UI/UX changes, or feature rollouts that could have negatively impacted user engagement.
- *A/B Tests:* Investigate if any ongoing A/B tests may have had unintended consequences on user activity.
- *Marketing Campaigns*: Examine if changes in marketing strategies, like pausing certain ads or promotions, could have led to decreased user acquisition.
- *Customer Feedback:* Monitor customer support channels and app store reviews to detect any uptick in complaints or issues reported by users.
- *Segmentation Analysis:* Look at MAU across different user segments (age, location, device type, etc.) to understand if the drop is isolated to specific groups.
- *Retention Metrics*: Assess if the decline is more significant among new users or existing ones to understand if the issue relates to acquisition, engagement, or retention.

External Factors:

- *Temporal Context:* Is the drop aligned with a holiday, seasonal trend, or other time-based events? This can be particularly relevant if your product is influenced by seasonality.
- *Competitive Landscape:* Investigate if a competitor made changes — such as a new feature or promotion — that might have lured your users away.
- *Global or Local Events:* Consider any external news or events, like a natural disaster or a significant political event, that could have impacted user behavior.
- *Cultural and Geographical Factors:* Assess if the drop is specific to a region, and consider any local events, laws, or trends that might explain it.

After identifying potential internal and external factors, the next step would be to synthesize this information and communicate it effectively to the interviewer. This should include not just the likely causes but also proposed solutions or actions for each identified factor. This categorized approach demonstrates your ability to think holistically about the multiple variables that can influence a product metric like MAU.

Discuss the Business Impact for a Scenario.

The second type of product sense question for data engineers is the business impact question. When interviewers pose a product sense question asking a data engineer to discuss the business impact of a scenario, they are looking to assess several key competencies.

Technical Understanding

- *Data Proficiency:* The ability to identify the types of data and metrics that would be relevant for analyzing the situation.
- *Data Pipeline Awareness:* Understanding of how data moves through systems and how it might be harnessed or queried to provide needed insights.

Analytical Skills

- *Problem-Solving:* Capability to break down a complex problem into smaller, more manageable components.
- *Critical Thinking*: Skill in assessing the implications of certain trends or changes in metrics, beyond just surface-level observations.

Business Acumen

- *Alignment with Business Goals:* Understanding of how technical changes or metrics tie back to the company's broader business objectives.
- *Revenue and Cost Implications:* Awareness of how changes could affect the company's bottom line, either positively or negatively.

Communication Skills

- *Clarity and Structure:* The ability to articulate thoughts clearly and logically, making it easy for non-technical stakeholders to understand the implications.
- *Stakeholder Management:* Skill in framing the findings or suggestions in a way that different stakeholders (like product managers, business analysts, or executives) can understand and act upon.

Context Awareness

- *Customer-Centricity*: The inclination to consider the user experience and its implications on metrics and business objectives.
- *Market Awareness:* An understanding of how certain changes could affect the company's positioning in the market or against competitors.

Initiative and Ownership

- *Actionable Recommendations:* Beyond just identifying the problem, offering concrete steps or solutions to address the issue.
- *Forward Thinking:* Considering the longer-term implications and recommending proactive steps that could prepare the business for future challenges.

The goal is to gauge whether the candidate can go beyond technical execution to think strategically, demonstrate business acumen, and communicate effectively with both technical and non-technical stakeholders.

An example of a product sense question for a data engineer that focuses on discussing the business impact for a scenario could be:

Question:

Imagine our company has recently made changes to the recommendation algorithm that suggests products to users on our e-commerce platform. After the change, we observe a 10% increase in click-through rates but a 5% decrease in conversion rates. Can you discuss the business impact of this scenario and what data you would look into to further understand what's happening?

Answer:

This situation presents a mixed bag of outcomes. On one hand, a 10% increase in click-through rates suggests that users find the recommended products more engaging or relevant, which could potentially lead to higher user satisfaction and more time spent on the platform. On the other hand, the 5% decrease in conversion rates indicates that despite clicking on the products, fewer users are actually making a purchase. This could mean lost revenue and potentially even lower user satisfaction if users feel that the recommendations aren't useful for purchasing.

To get a comprehensive understanding, as a data engineer, I'd want to collect and analyze several additional pieces of data. I'd start by segmenting the increase in click-through and decrease in conversion rates by various factors like user demographics, device types, and geographic locations. I'd also want to look into the average order value and overall customer lifetime value before and after the algorithm change. Perhaps we are getting more clicks, but from users who tend to spend less. Additionally, I'd want to examine user behavior post-click to understand why they are not converting. This could involve analyzing time spent on product pages, interactions like reviews read or images clicked, and funnel analysis to see at what point we're losing potential customers. The goal would be to give a comprehensive view to the business team so they can understand both the positive and negative impacts of the algorithm change on revenue and customer satisfaction.

By focusing on these areas, the data can provide actionable insights that can help us adjust our recommendation algorithm for better alignment with business goals. In this type of product sense interview, soft skills are key:

Soft Skills

- *Be Concise Yet Detailed:* While it's important to be thorough, also strive to communicate your points as clearly and concisely as possible.
- *Be Open to Feedback*: Listen carefully to any insights or suggestions the interviewer might offer and be prepared to adapt your approach accordingly.
- *Demonstrate Curiosity:* Show a keen interest in getting to the root of the problem. This can be as simple as asking thoughtful questions that go beyond the surface level of the issue.
- *Stay Calm:* Troubleshooting under interview conditions can be stressful, but maintaining your composure will reflect well on your ability to handle real-world pressure.

By following this approach, you'll demonstrate not only your technical expertise but also your communication skills, analytical reasoning, and ability to work collaboratively — attributes that are highly valued in data engineering roles.