

## Oral Exam Version A

### Conceptual Questions (20 pts each)

1. **Describe how collisions are handled in a hash map that uses a fixed-size array with linked list chains.** Why is this method used, and what are its trade-offs?
2. **Explain what properties a good hash function should have.** How might poor hash function design affect the performance of a hash map?
3. **Analyze the best-case and worst-case time complexity of searching for a key in a hash map.** What conditions lead to each?

### Applied Use Case (40 pts)

Imagine you're designing an app for scheduling tutoring appointments in the Academic Support Center. Would a hash map be a good choice for organizing appointments by student ID? Justify your answer.

## Oral Exam Version B

### Conceptual Questions (20 pts each)

1. **Describe how collisions are handled in a hash map that uses a fixed-size array with linked list chains.** Why is this method used, and what are its trade-offs?
2. **Explain what properties a good hash function should have.** How might poor hash function design affect the performance of a hash map?
3. **Analyze the best-case, average-case, and worst-case time complexity of searching for a key in a hash map.** What conditions lead to each?

### Applied Use Case (40 pts)

Suppose you're building a lost-and-found database for Willamette University where items are stored by location found (e.g., Sparks, Ford, Montag). Would a hash map be effective? Explain how you'd structure the keys and values.

## Oral Exam Version C

### Conceptual Questions (20 pts each)

1. **Describe how collisions are handled in a hash map that uses a fixed-size array with linked list chains.** Why is this method used, and what are its trade-offs?
2. **Explain what properties a good hash function should have.** How might poor hash function design affect the performance of a hash map?
3. **Analyze the best-case and worst-case time complexity of searching for a key in a hash map.** What conditions lead to each?

### Applied Use Case (40 pts)

You're creating a meal-tracking app for Goudy Commons that maps student IDs to their recent meal check-ins. Would a hash map be appropriate here? Explain how you'd use it and any challenges that might arise.

## Oral Exam Version D

### Conceptual Questions (20 pts each)

1. **Describe how collisions are handled in a hash map that uses a fixed-size array with linked list chains.** Why is this method used, and what are its trade-offs?
2. **Explain what properties a good hash function should have.** How might poor hash function design affect the performance of a hash map?
3. **Analyze the best-case and worst-case time complexity of searching for a key in a hash map.** What conditions lead to each?

### Applied Use Case (40 pts)

If you were managing a campus-wide club registry app, where club names map to student leader contact info, how could a hash map help or hurt the system design?

## Oral Exam Version E

### Conceptual Questions (20 pts each)

1. **Describe how collisions are handled in a hash map that uses a fixed-size array with linked list chains.** Why is this method used, and what are its trade-offs?
2. **Explain what properties a good hash function should have.** How might poor hash function design affect the performance of a hash map?
3. **Analyze the best-case and worst-case time complexity of searching for a key in a hash map.** What conditions lead to each?

### Applied Use Case (40 pts)

You are designing a system to match students to their faculty advisors. You are considering using a hash map. What benefits and potential issues would arise? Are there better alternatives?