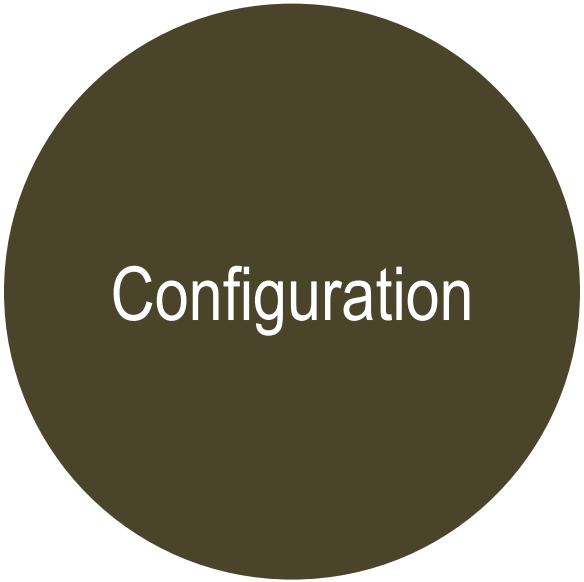
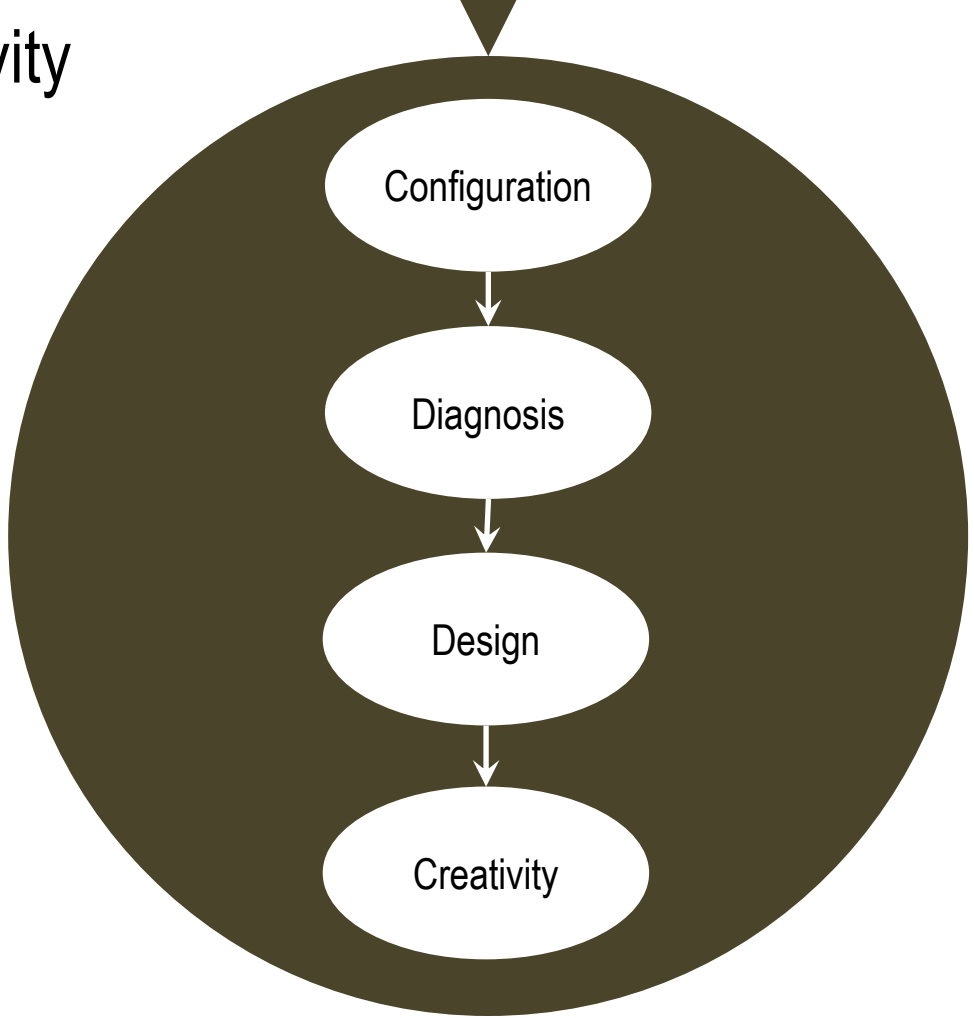

Configuration

Design & Creativity



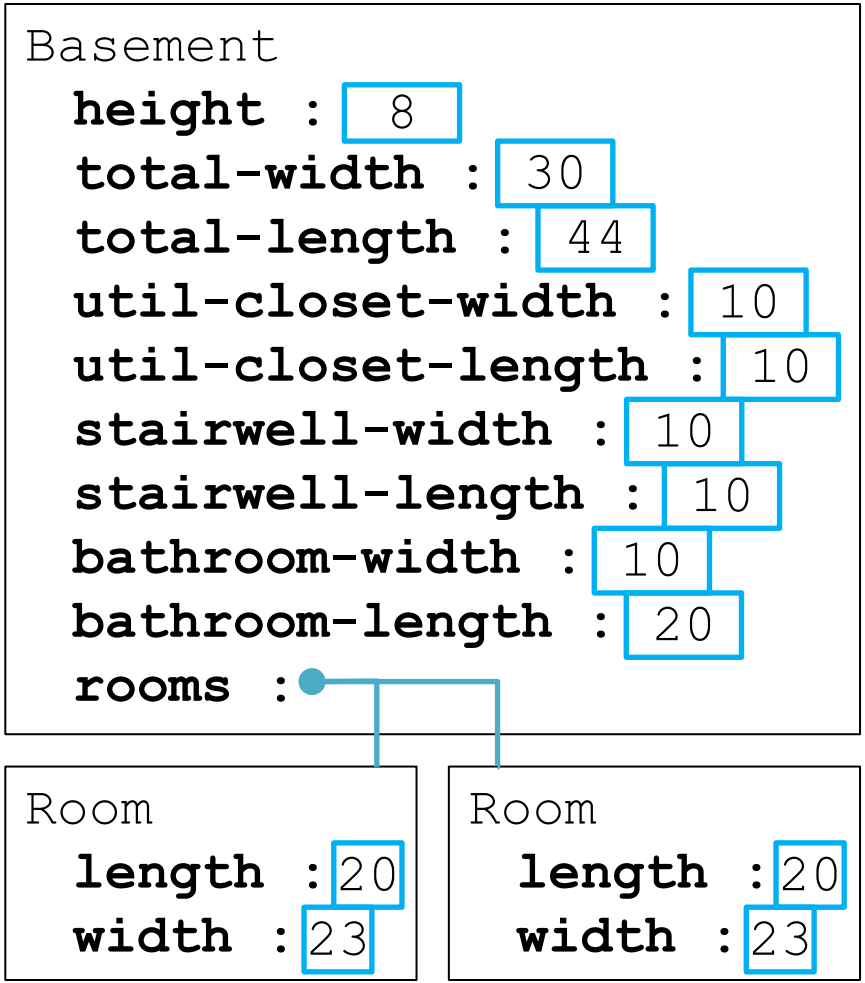
Lesson Preview

- Design & configuration
- Plan refinement
- Connections to earlier topics

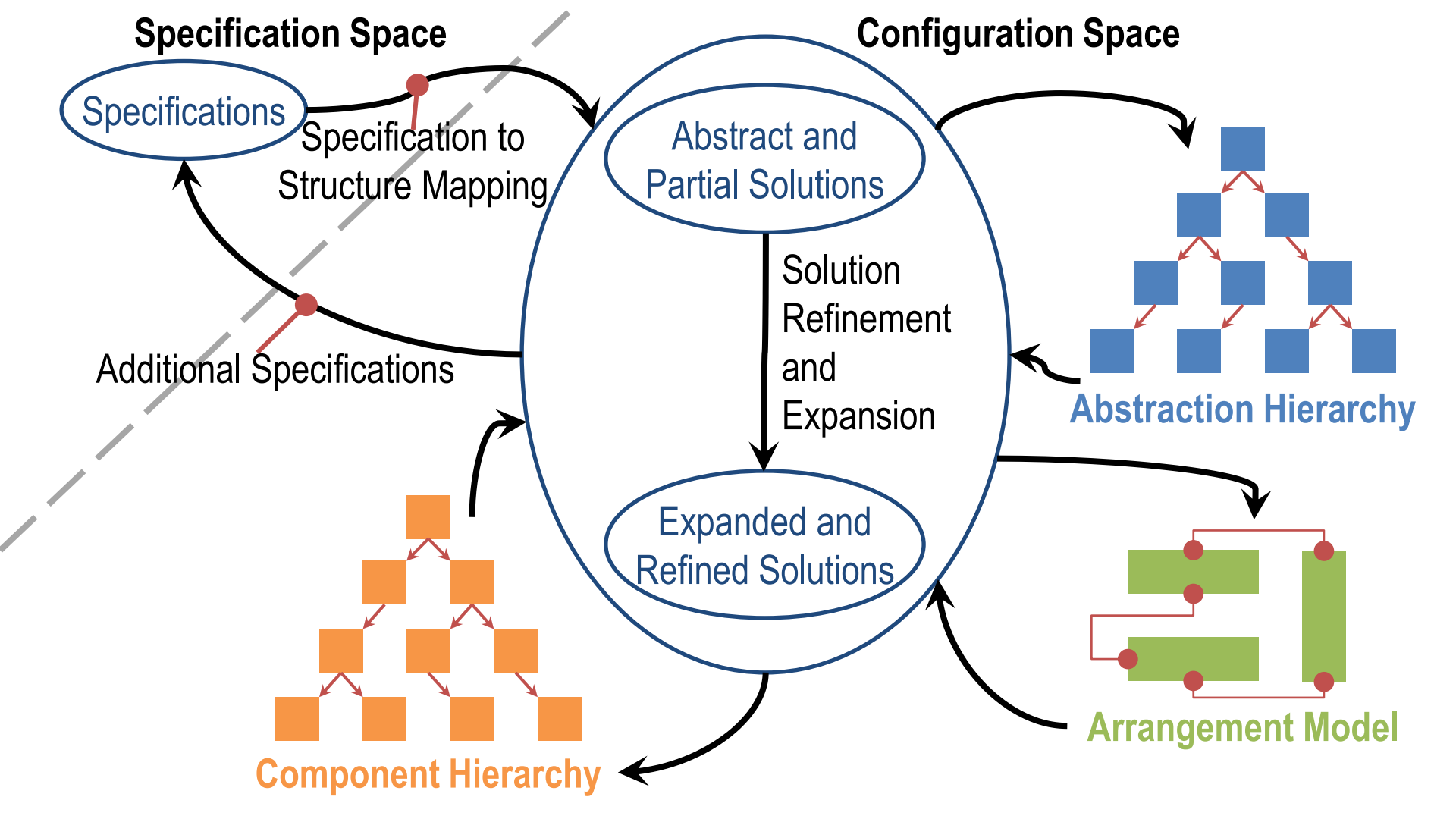
Requirements:

- Total area must equal sum of areas of individual rooms.
- All rooms must be rectangular.
- Utility closet and stairwell must each be at least 100 square feet.
- No length or width can be under 10 feet.

- Length is 44, width is 30.
- Bathroom must be at least 200 square feet.
- Two other rooms, each at least 400 square feet.



Configuration: A problem-solving activity that assigns values to variables to satisfy constraints.


Specification Space
Configuration Space
Specifications
Specification to
Structure Mapping
Abstract and
Partial Solutions
Solution
Refinement
and
Expansion
Additional Specifications
Abstraction Hierarchy
Expanded and
Refined Solutions
Component Hierarchy
Arrangement Model

Chair

mass :

cost :

legs :

seat :

arms :

back :

Chair
- **mass :**
- **cost :**
- **legs :**
- **seat :**
- **arms :**
- **back :**

Chair Legs
- **count :**
- **size :**
- **material :**
- **cost :**

Chair Seat
- **size :**
- **material :**
- **cost :**

Chair Arms
- **size :**
- **material :**
- **cost :**

Chair Back
- **size :**
- **material :**
- **cost :**

Chair
- **mass :**
- **cost :**
- **legs :**
- **seat :**
- **arms :**
- **back :**

Chair Legs
- **count :** {3, 4, 5}
- **size :** {5 – 50g}
- **material :** {}
- **cost :**

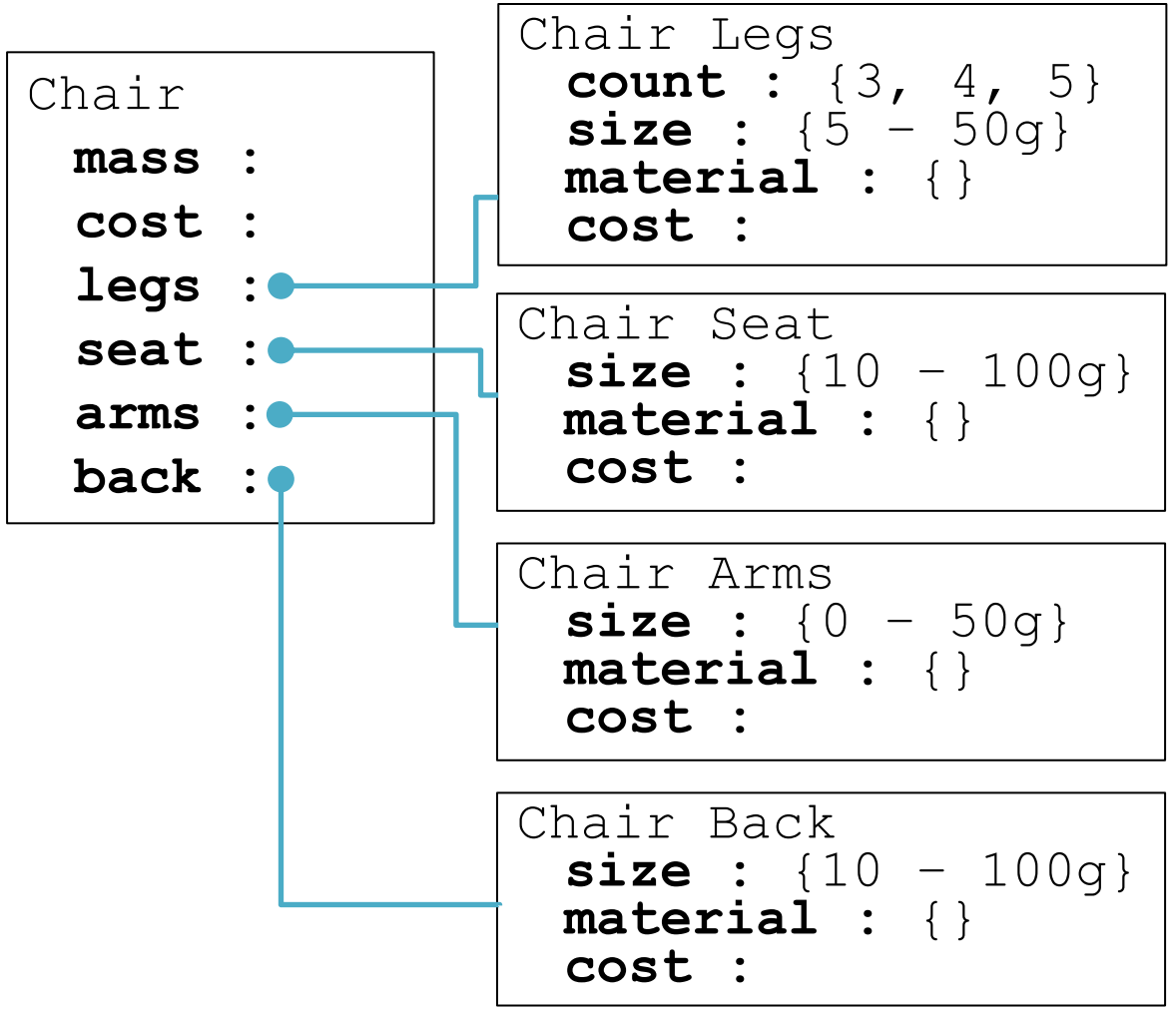
Chair Seat
- **size :** {10 – 100g}
- **material :** {}
- **cost :**

Chair Arms
- **size :** {0 – 50g}
- **material :** {}
- **cost :**

Chair Back
- **size :** {10 – 100g}
- **material :** {}
- **cost :**

Materials Table

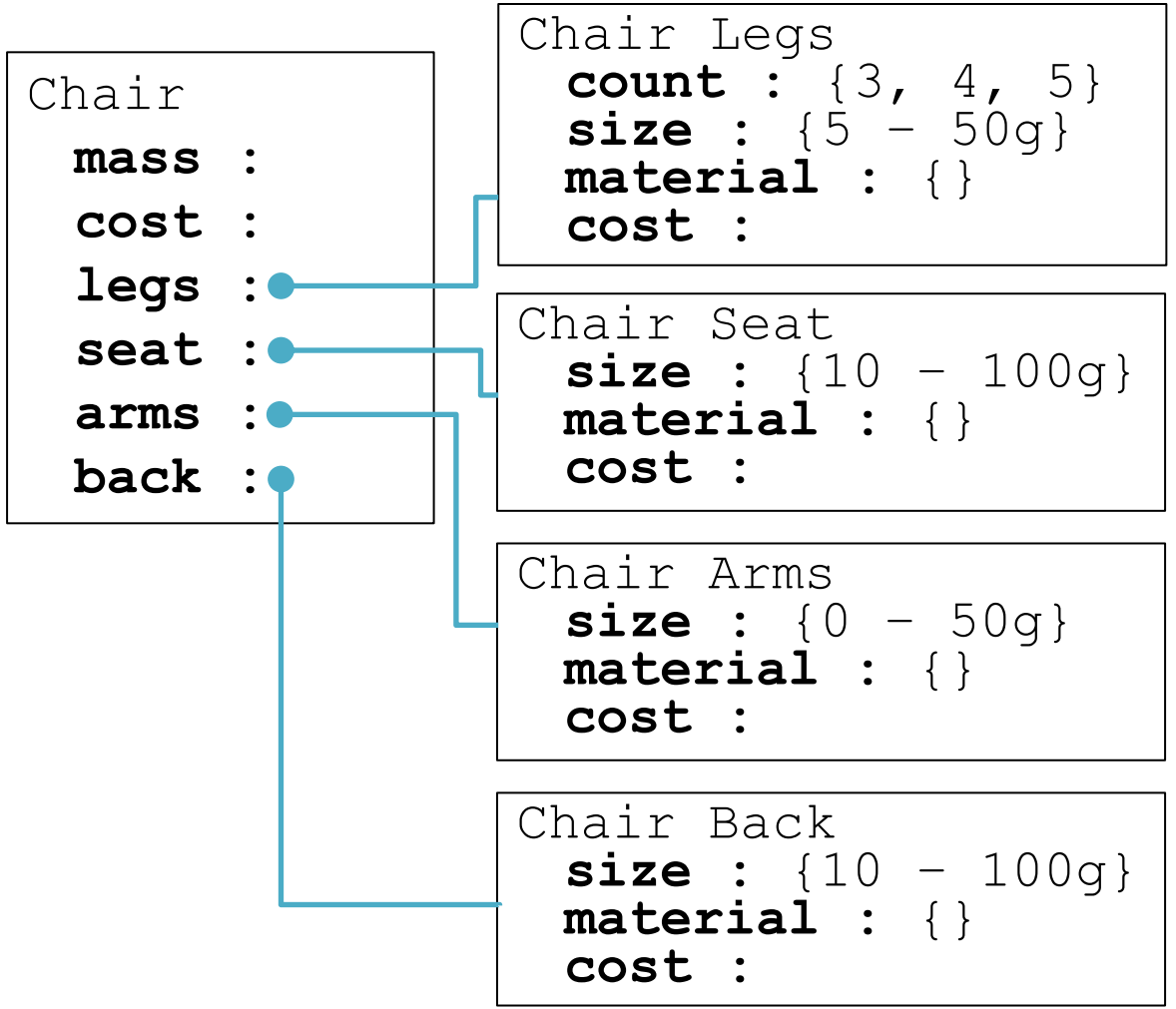
Material	Cost per gram
Plastic	$0.01
Wood	$0.05
Metal	$0.10



Order:
A chair that weighs over 200g, costs at most $20 to make, and has 4 legs.

Materials Table

Material	Cost per gram
Plastic	$0.01
Wood	$0.05
Metal	$0.10



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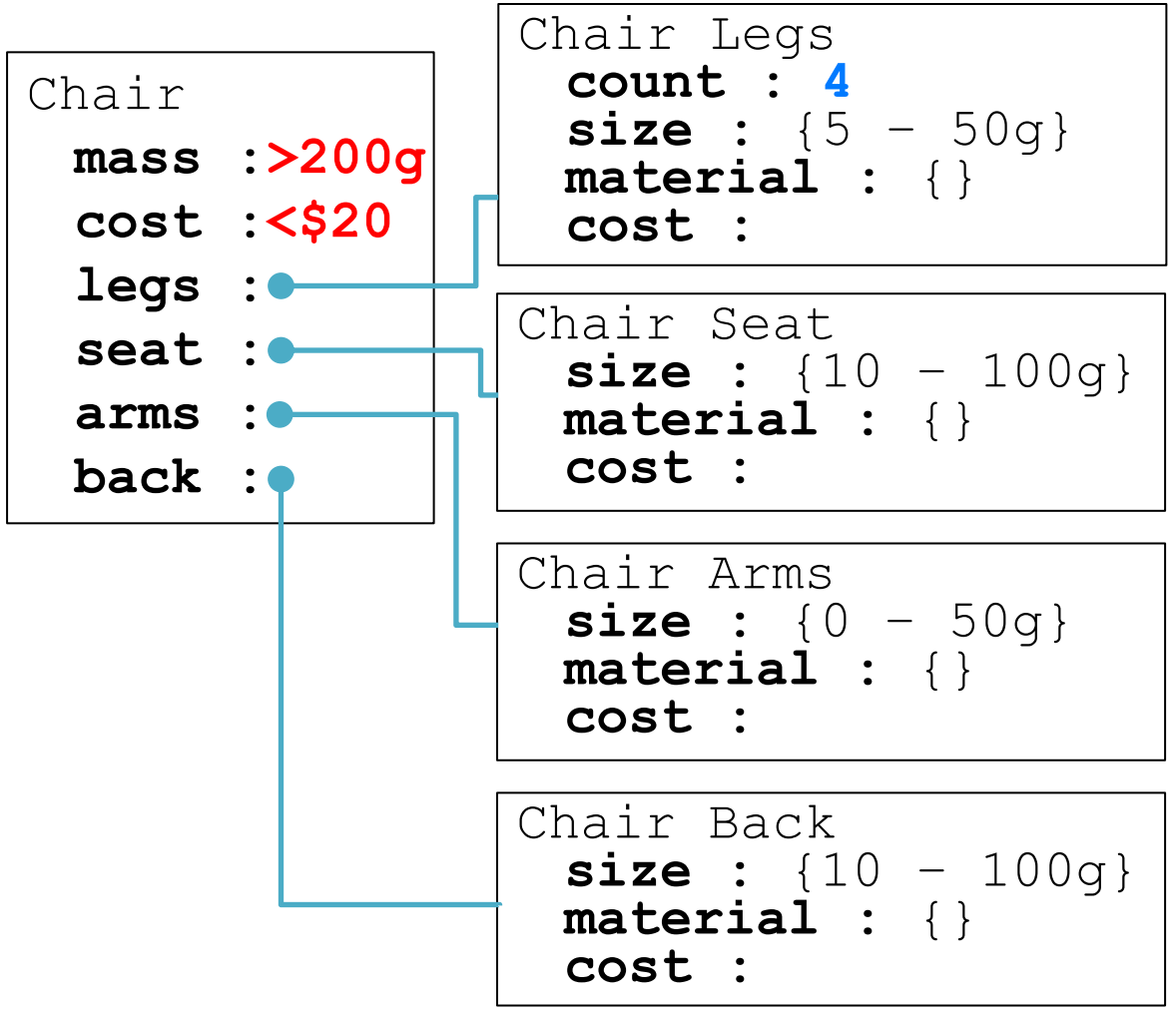

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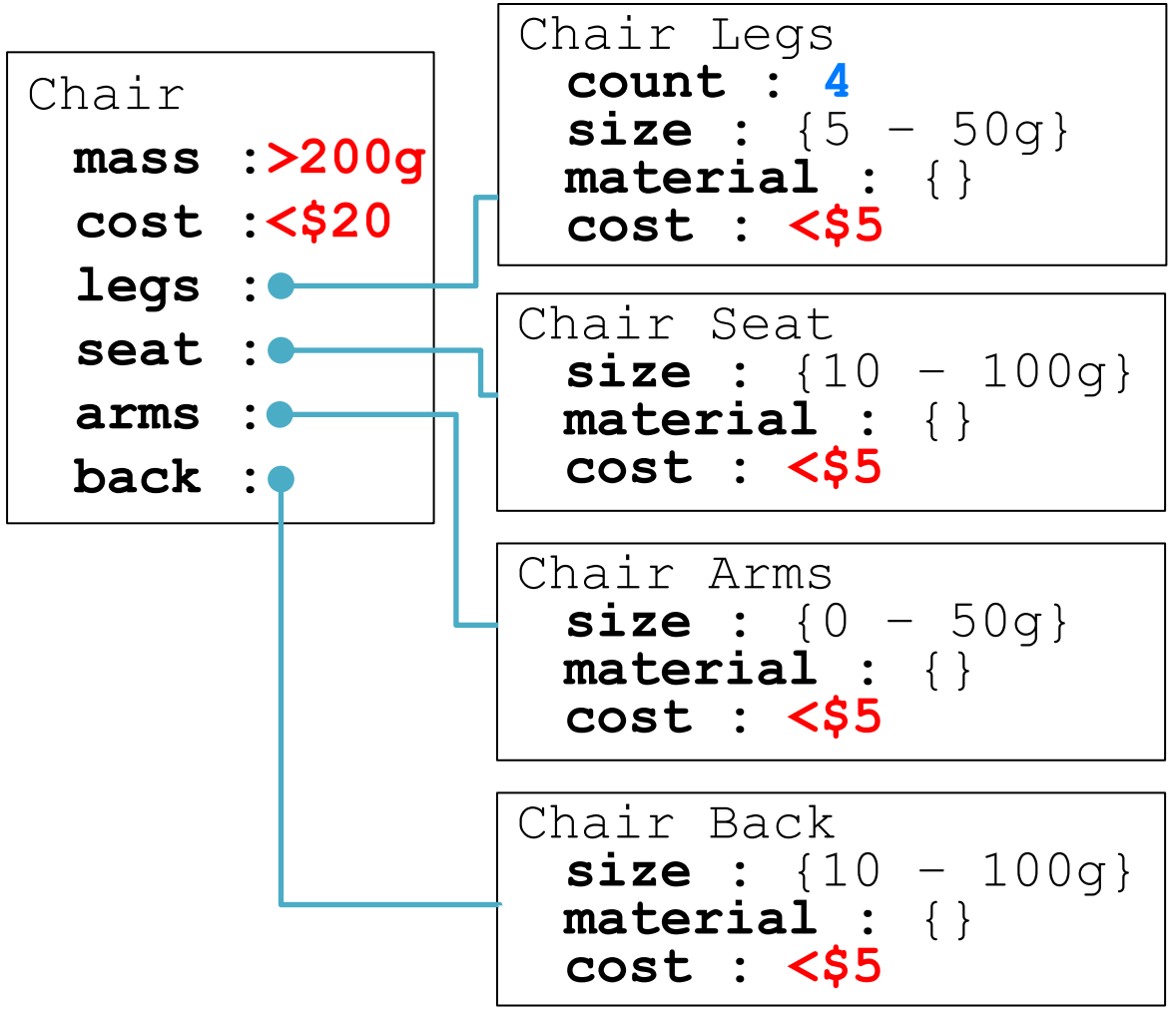

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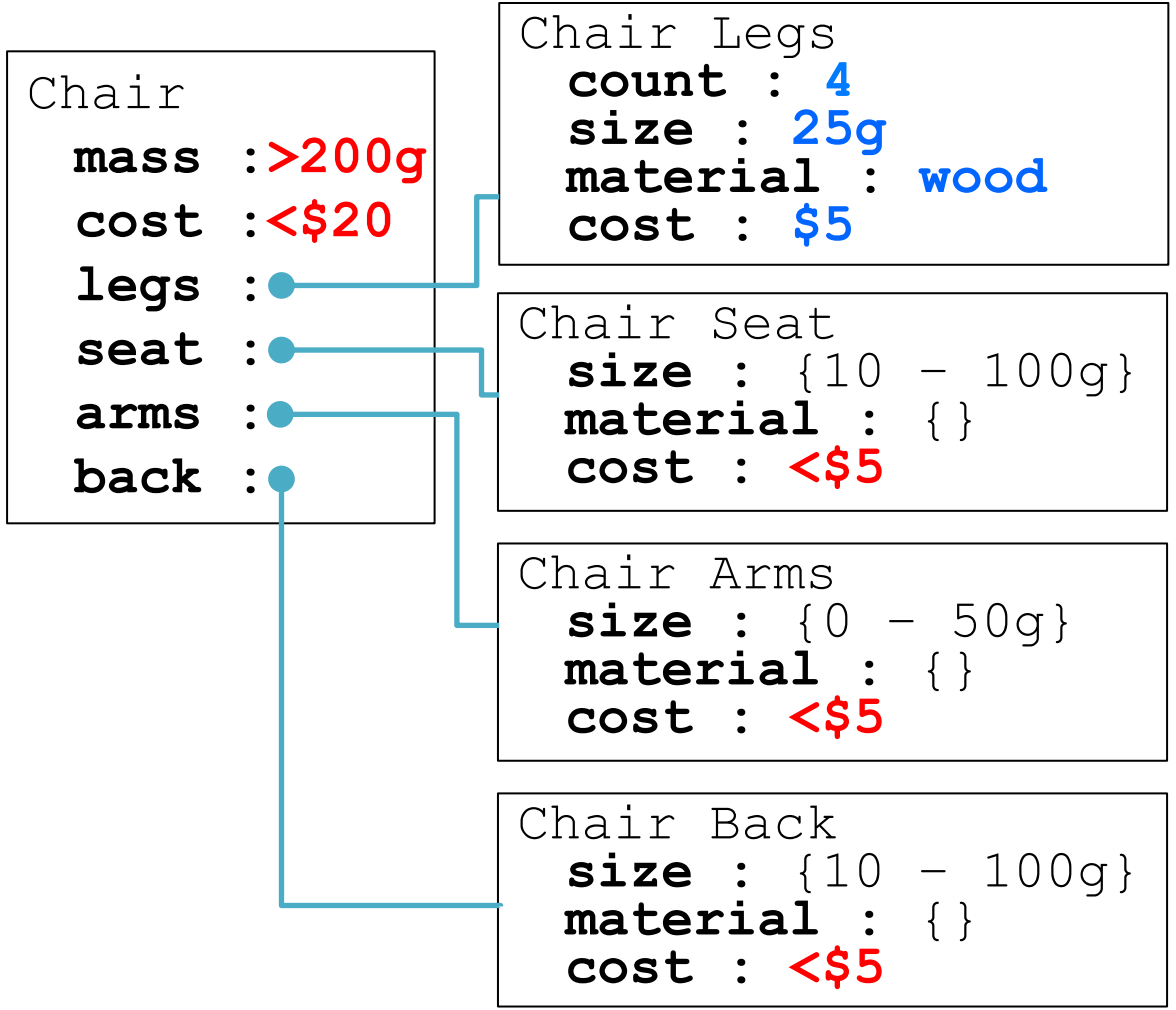

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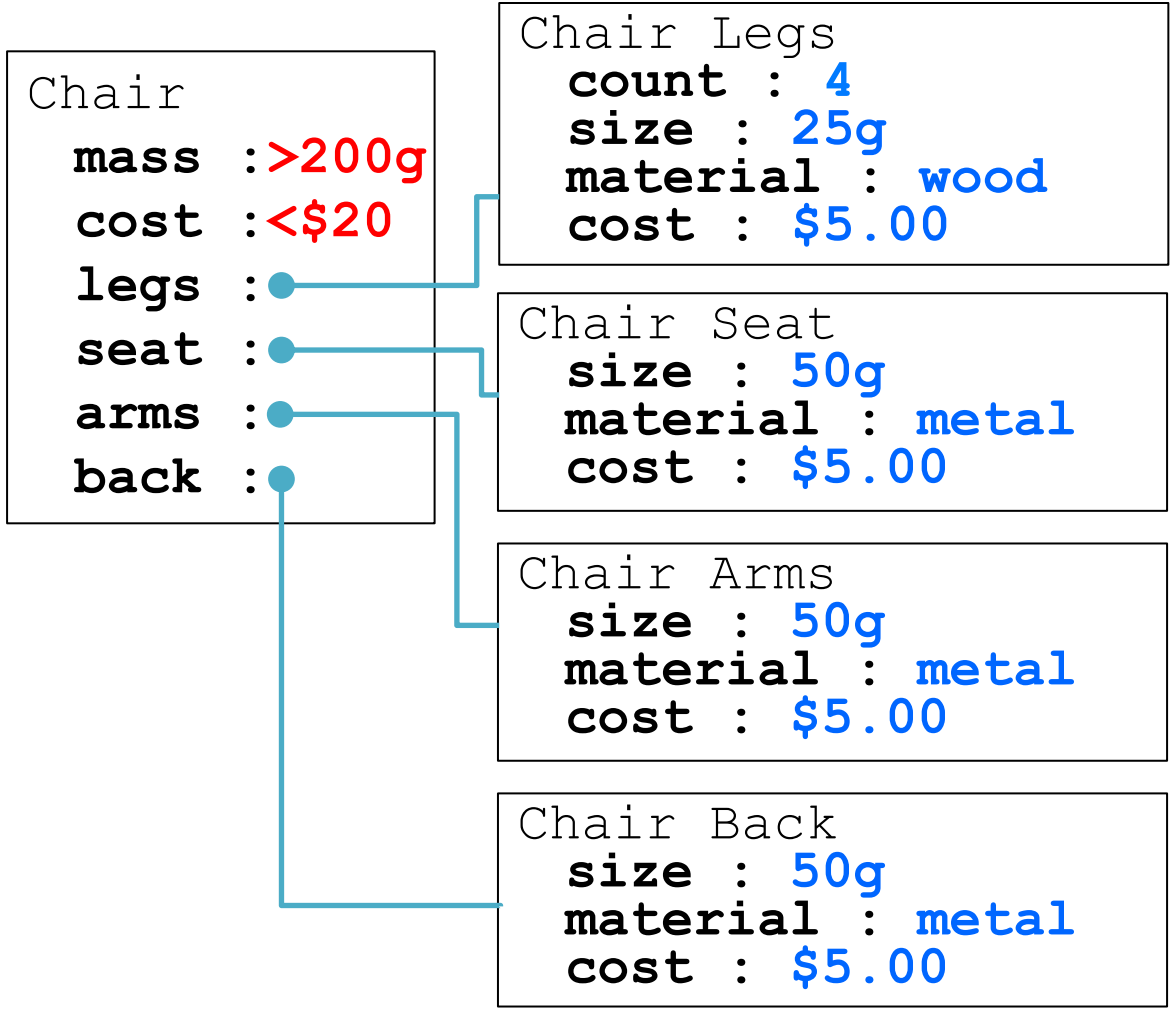

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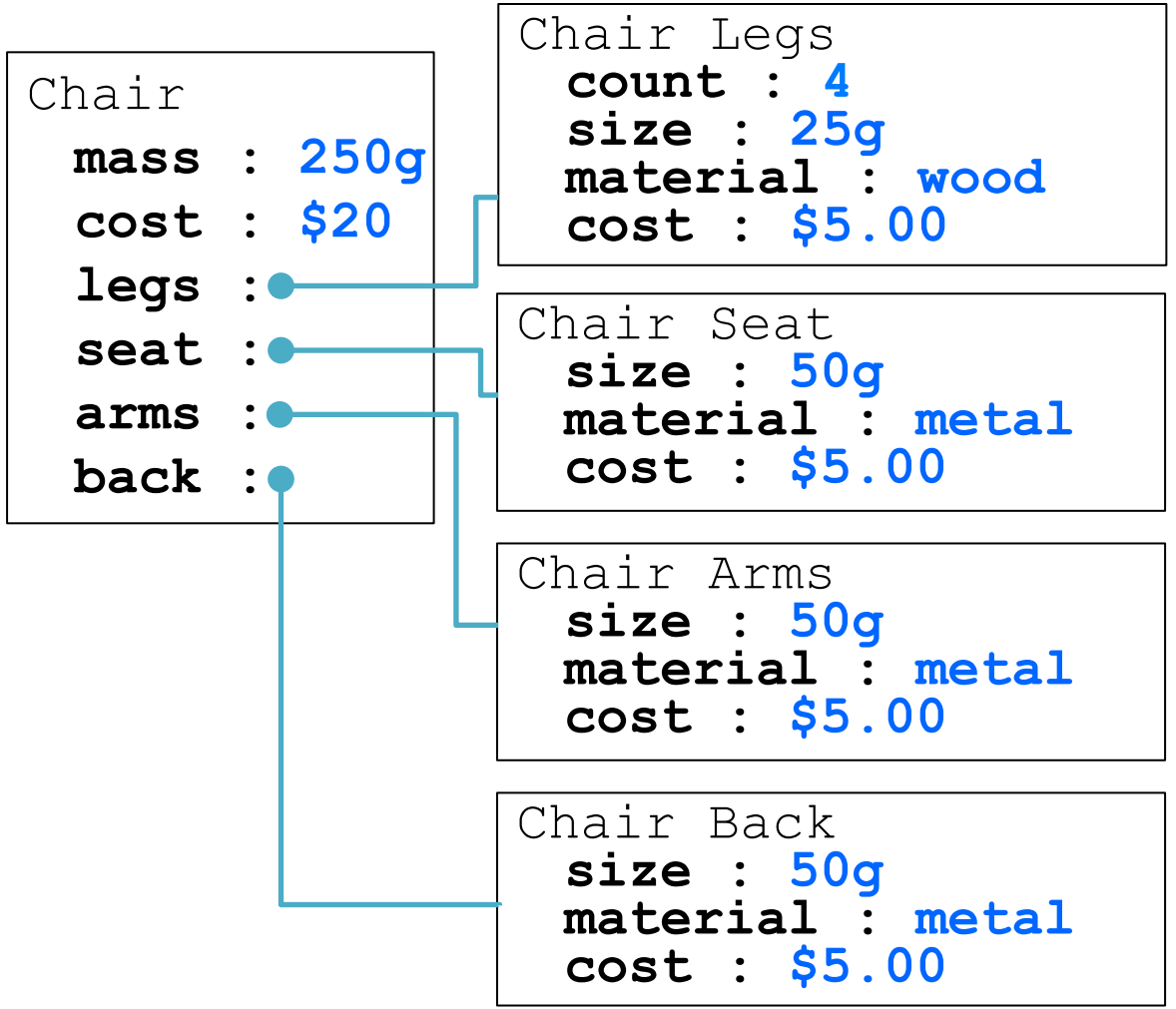
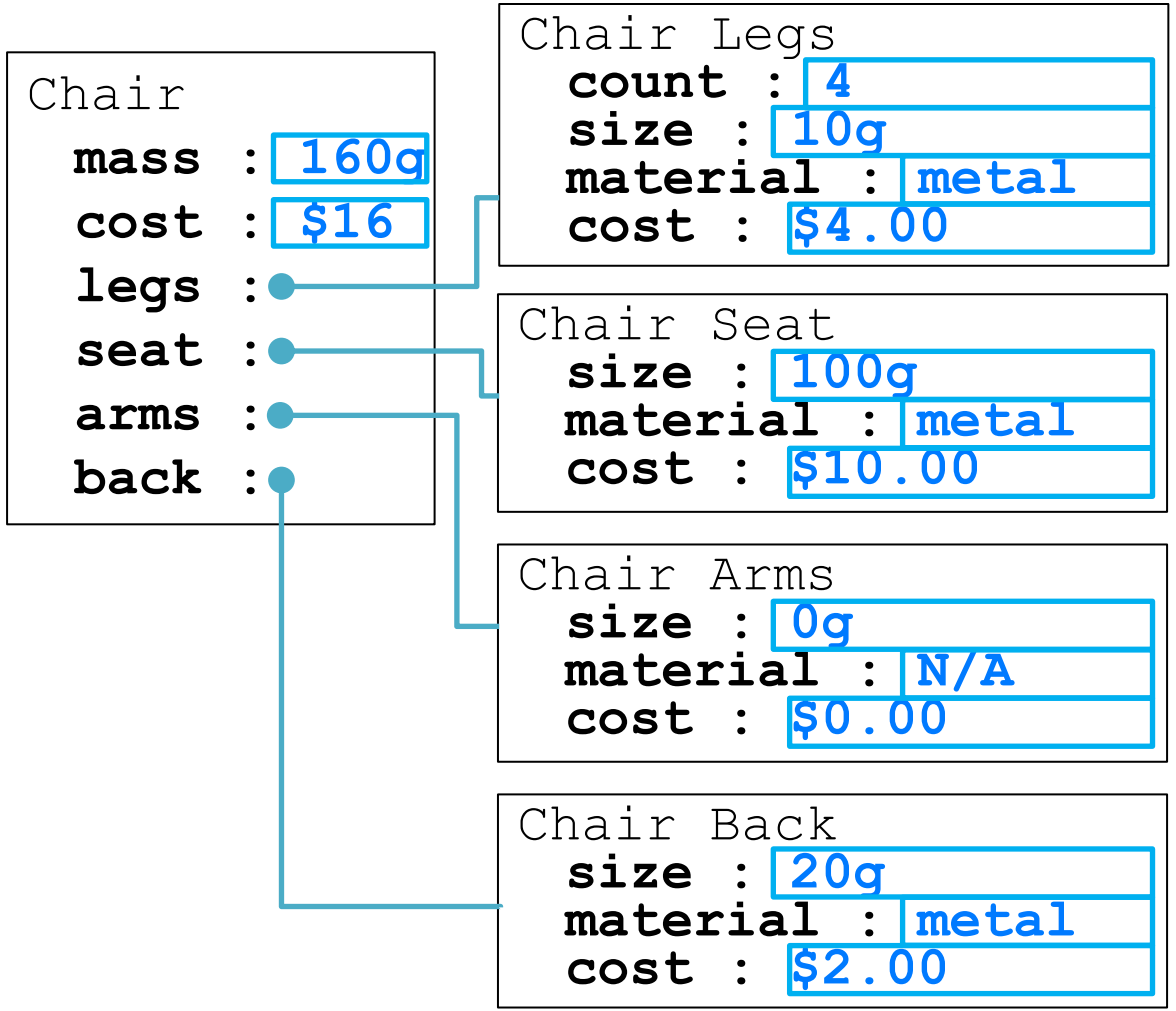


Fill this order:

A chair that costs at most $16 to make and has a 100g metal seat.

Materials Table

Material	Cost per gram
Plastic	$0.01
Wood	$0.05
Metal	$0.10



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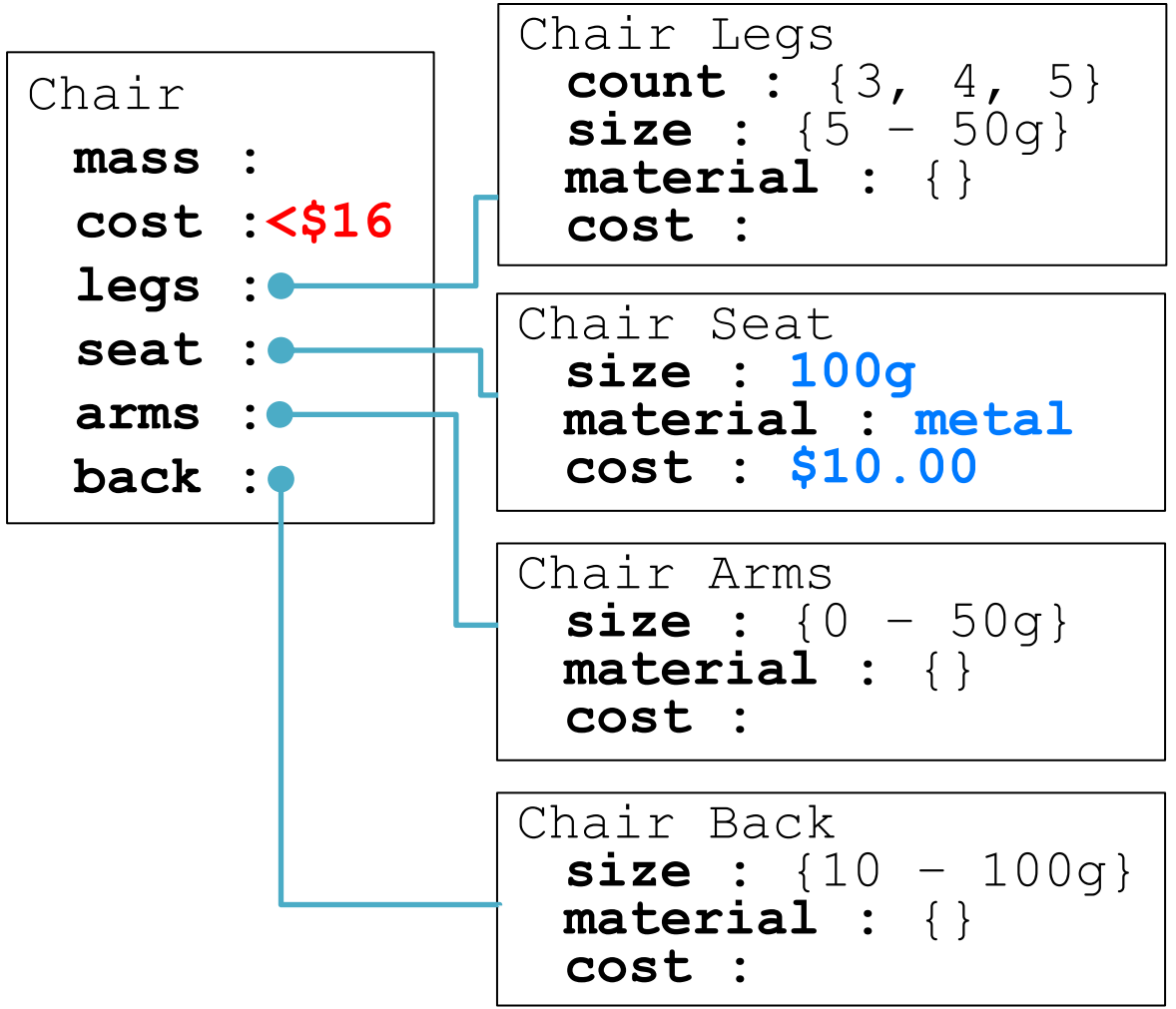

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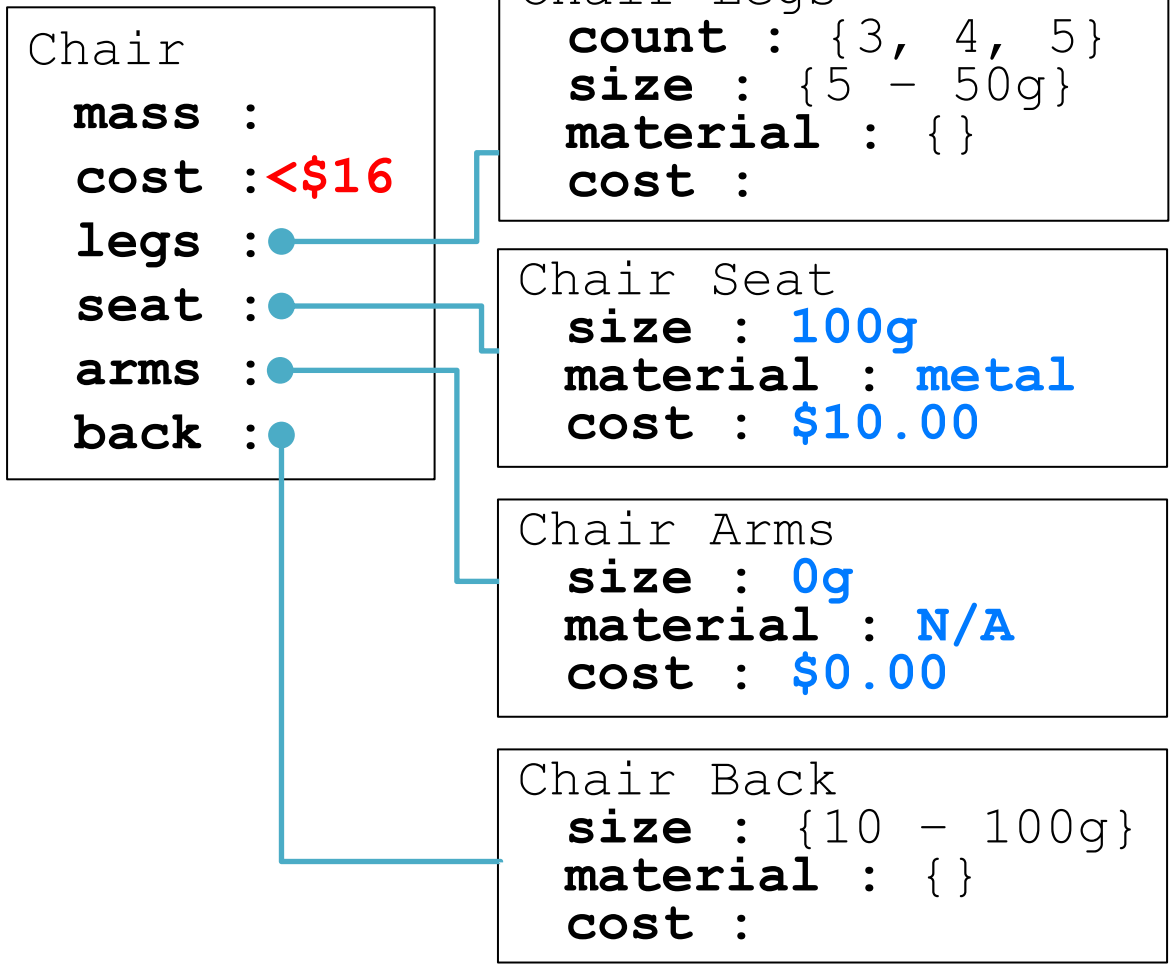

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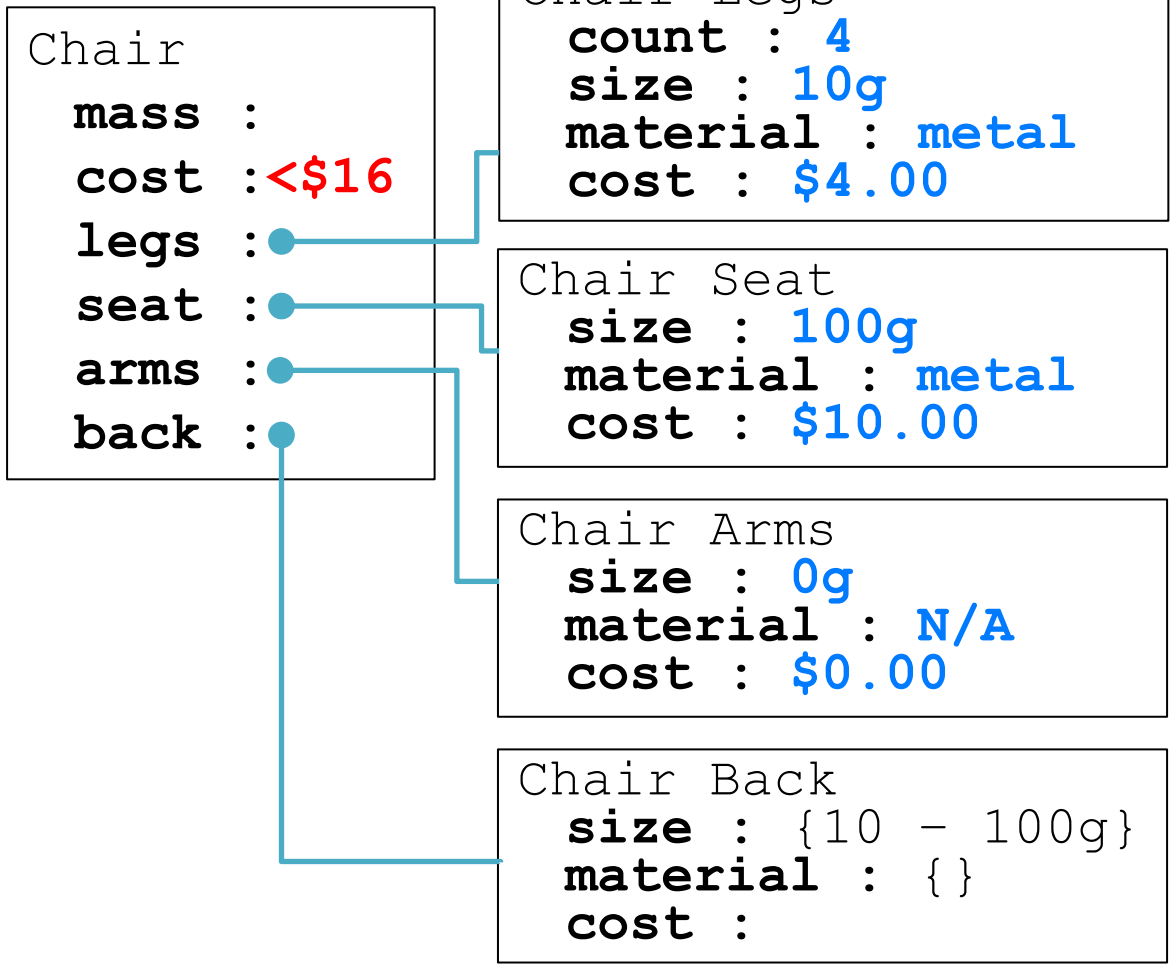

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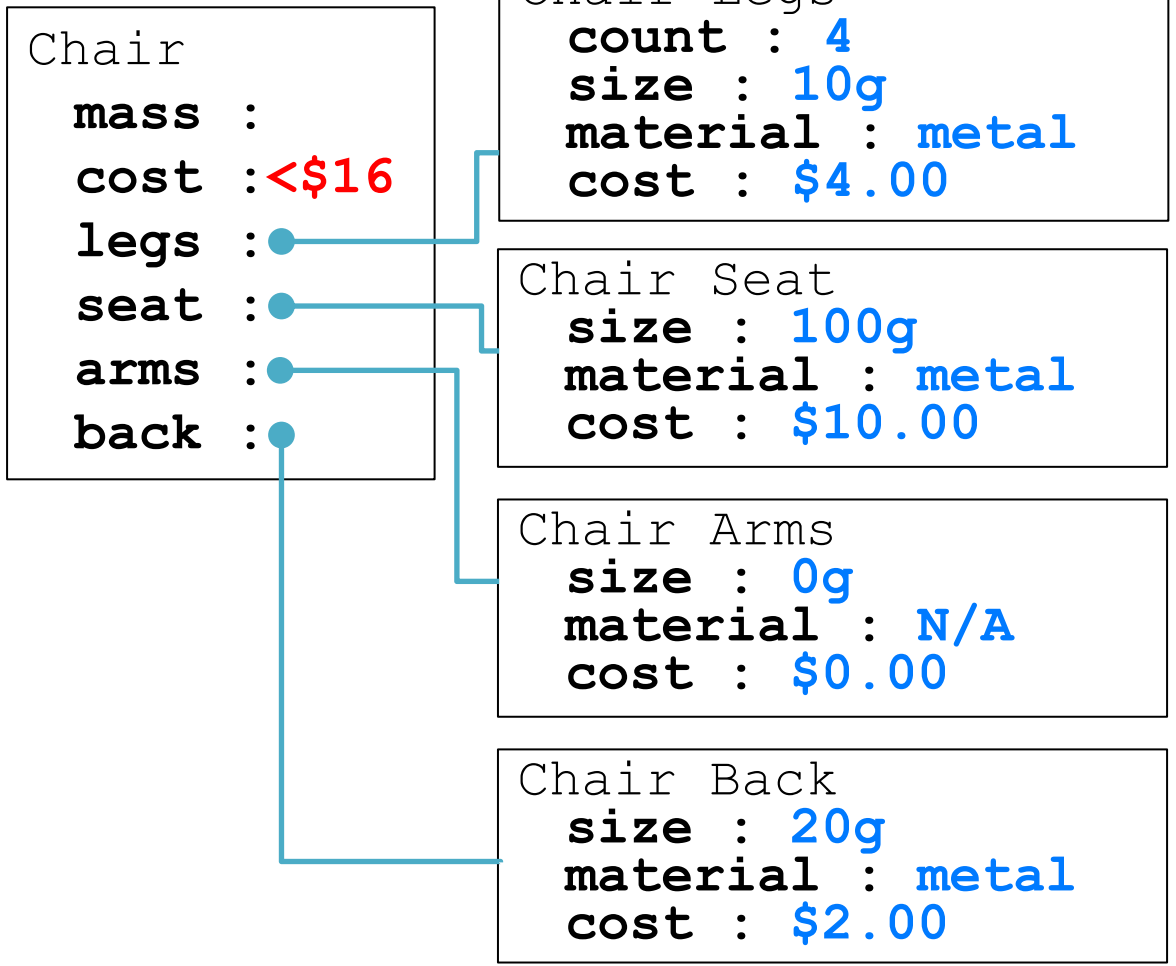
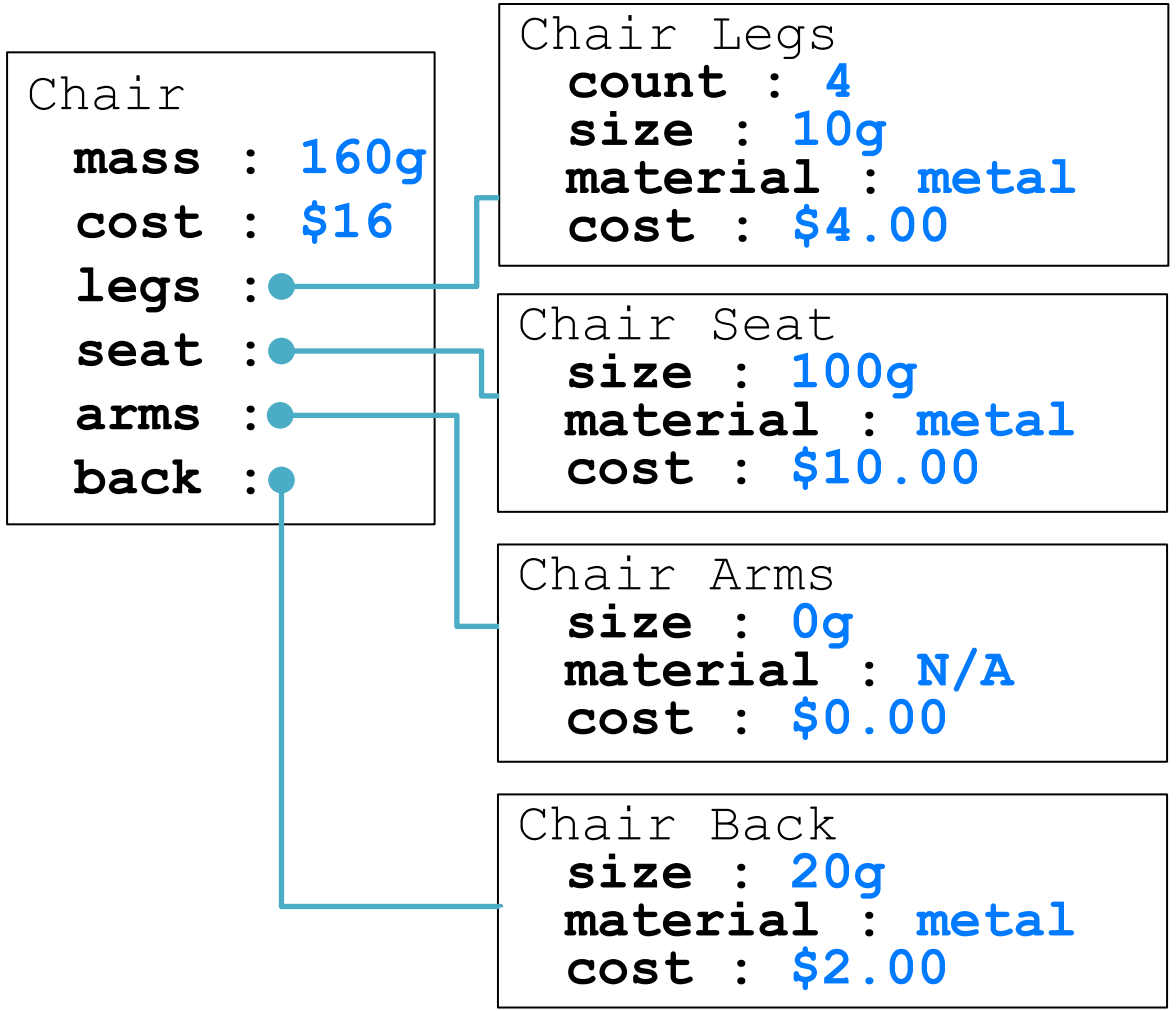
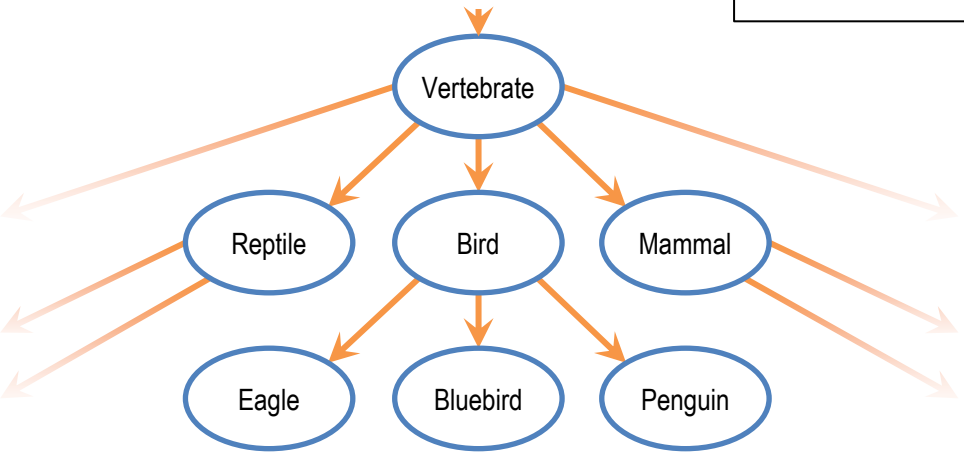



Chair
mass : 160g
cost : $16
legs :
seat :
arms :
back :
Chair Legs
count : 4
size : 10g
material : metal
cost : $4.00
Chair Seat
size : 100g
material : metal
cost : $10.00
Chair Arms
size : 0g
material : N/A
cost : $0.00
Chair Back
size : 20g
material : metal
cost : $2.00

Classification and configuration are both hierarchical.

Configuration leverages classification's notion of prototype concepts.




```
Chair
  mass  : 160g
  cost  : $16
  legs  :
  seat  :
  arms  :
  back  :
```

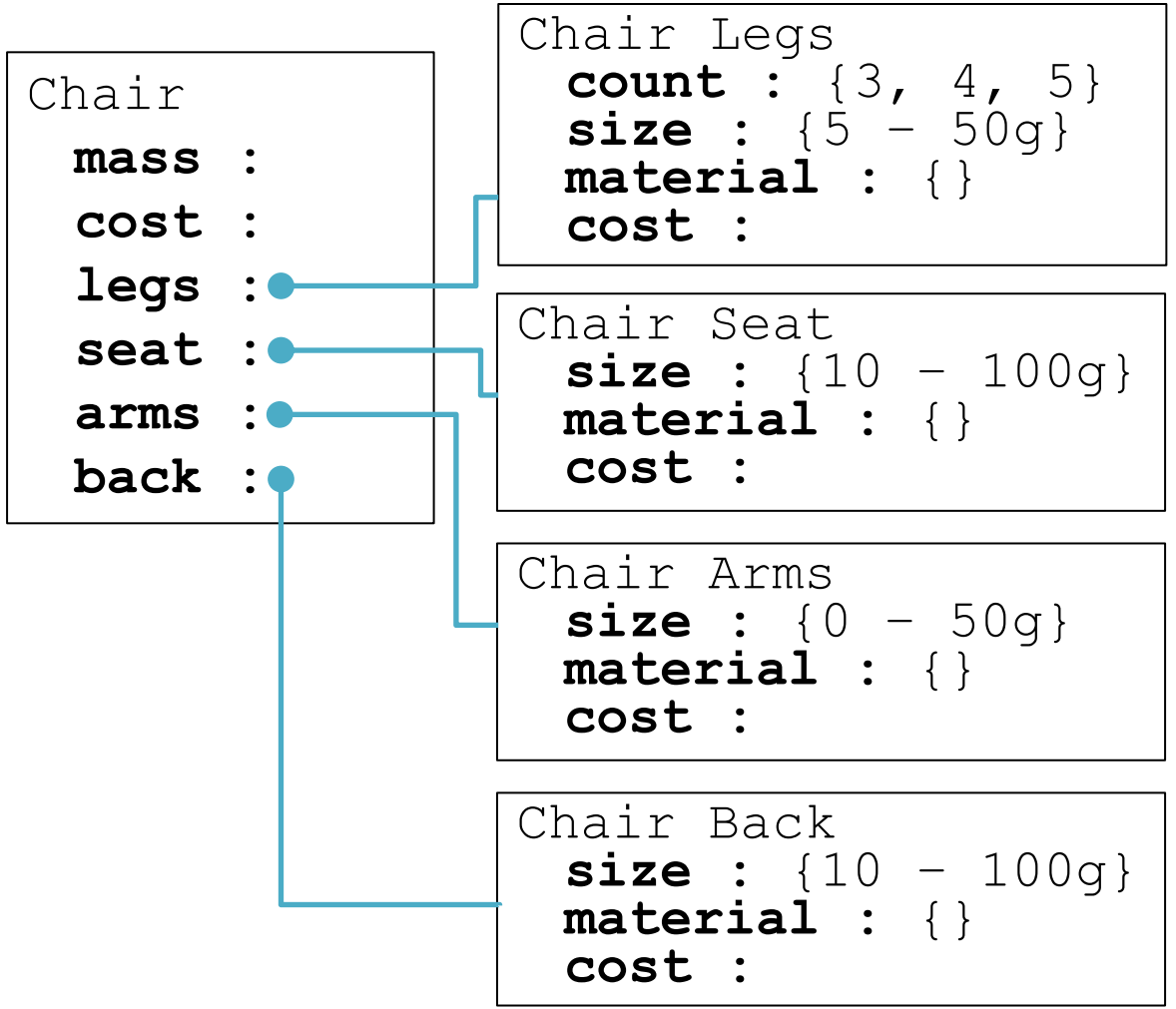
```
Chair Legs
  count : 4
  size : 10g
  material : metal
  cost : $4.00
```

```
Chair Seat
  size : 100g
  material : metal
  cost : $10.00
```

```
Chair Arms
  size : 0g
  material : N/A
  cost : $0.00
```

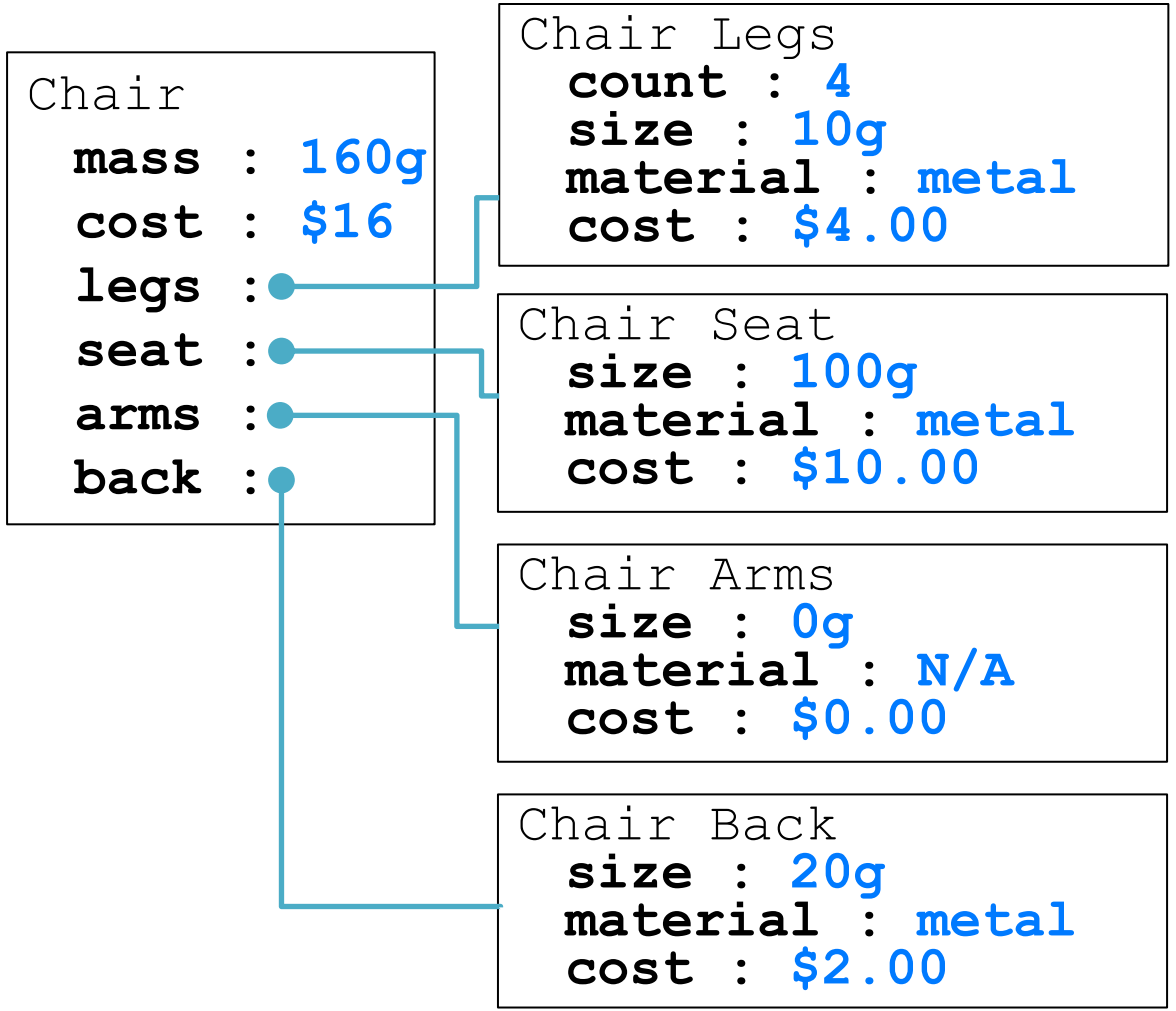
```
Chair Back
  size : 20g
  material : metal
  cost : $2.00
```

Configuration suggests starting with a prototype concept and assigning values to variables.

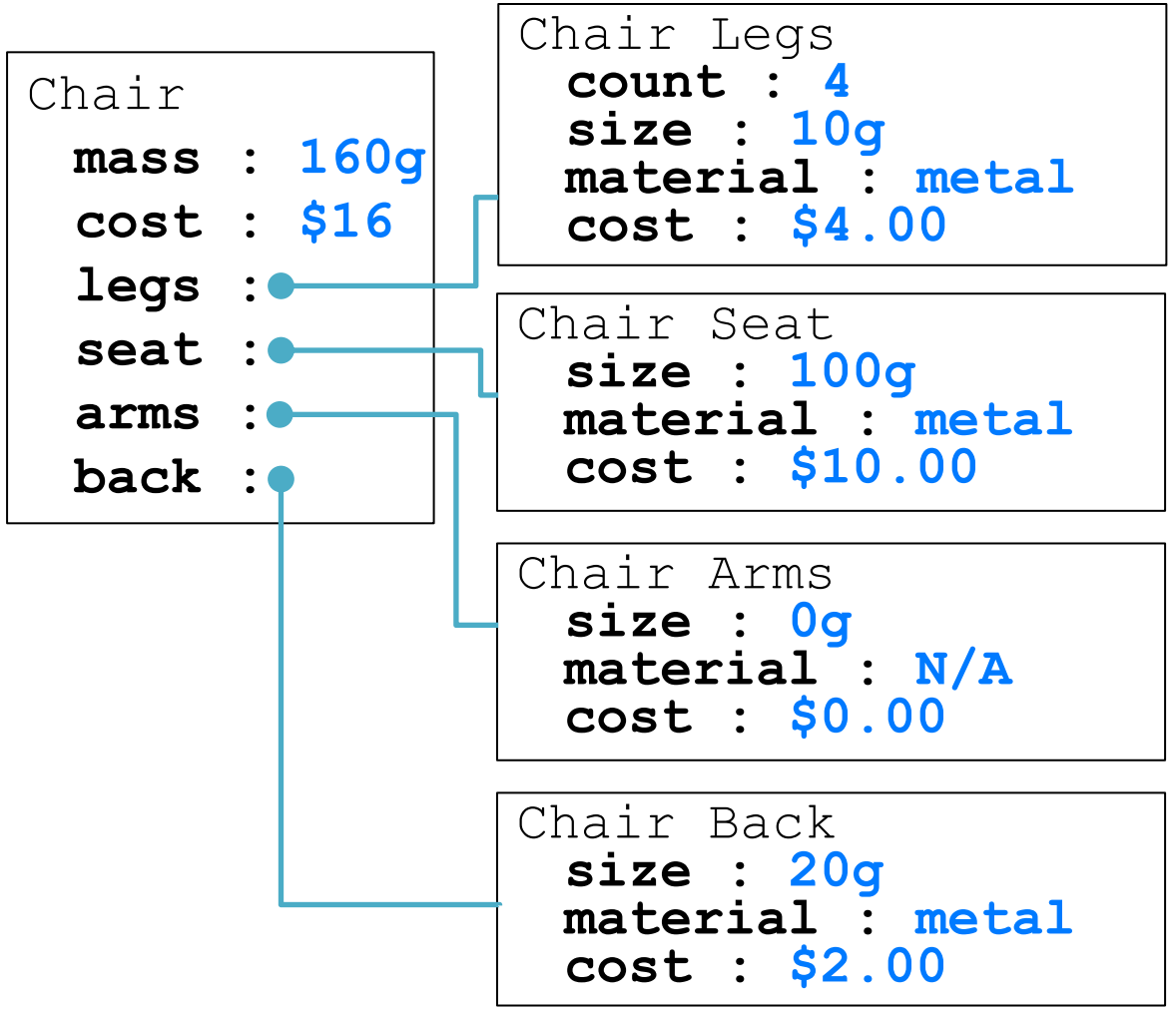


Configuration suggests starting with a prototype concept and assigning values to variables.

Case-based reasoning suggests starting from a specific chair and tweaking it as needed.



The result of a planning task can lead to a prototype that can subsequently be configured for similar problems with differing constraints.



Assignment

How would you use configuration to design an agent that could answer Raven's progressive matrices?

To recap…

- Design
- Defining configuration
- Process of configuration
- Connections to earlier topics