

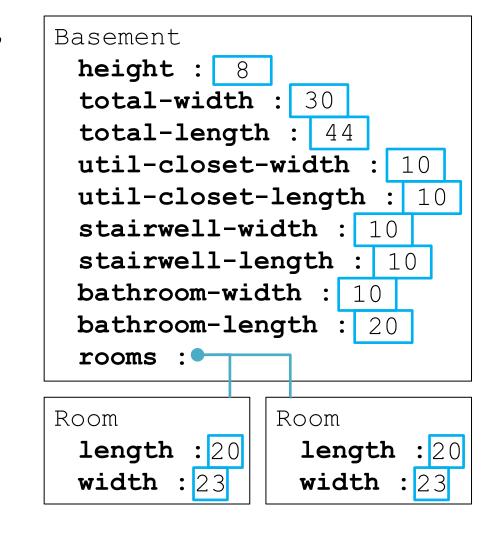
Lesson Preview

- Design & configuration
- Plan refinement

- Connections to earlier topics

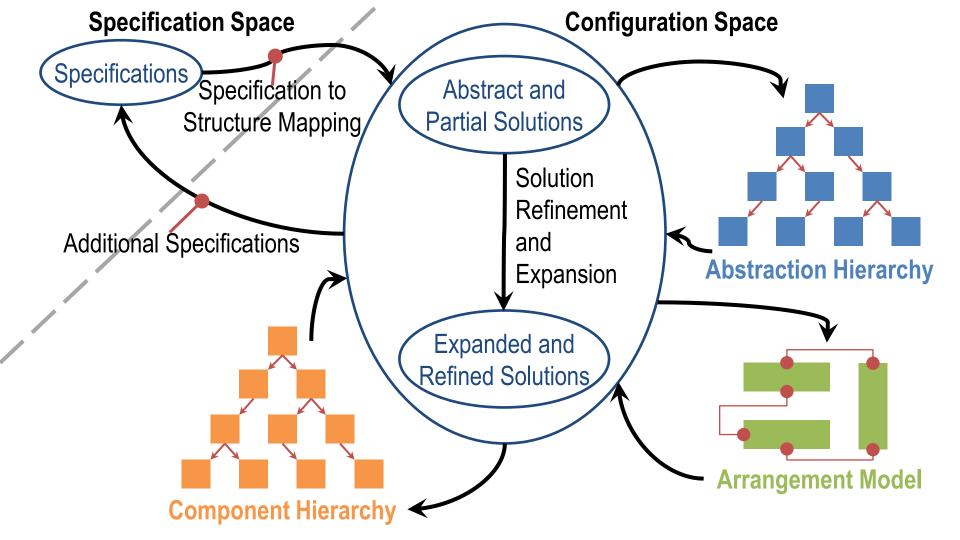
Requirements:

- 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.







Chair

mass :

cost :

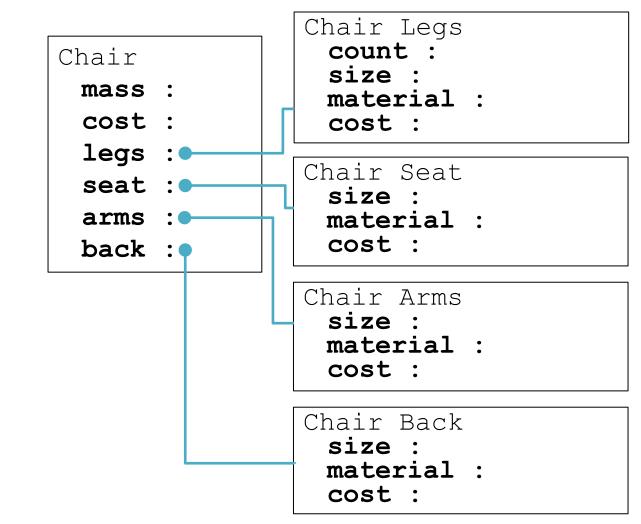
legs :

seat :

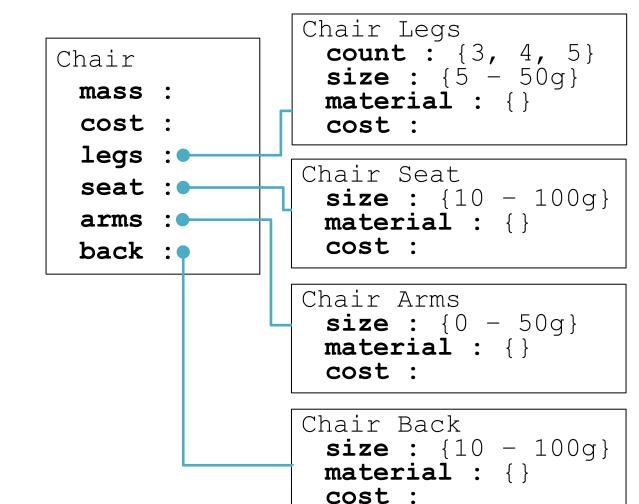
arms :

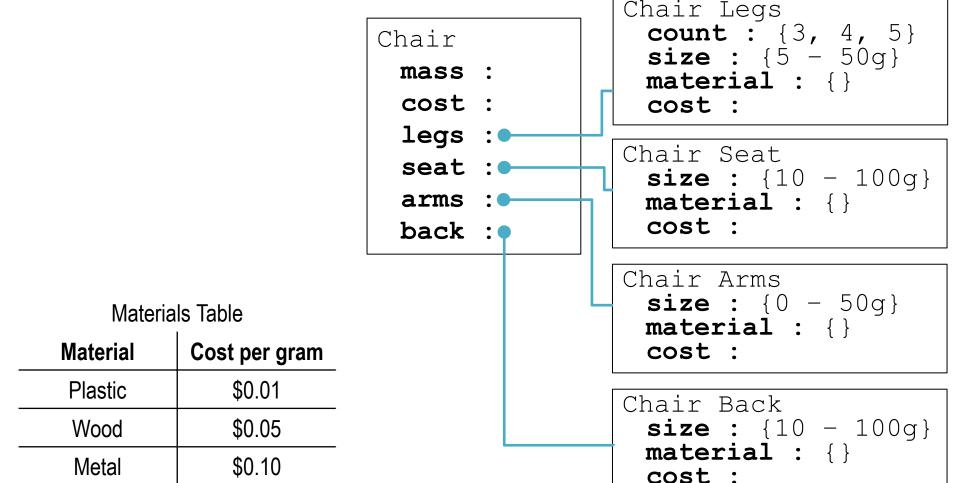
back :











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

Material

Plastic

Wood

Metal

Chair mass: cost : legs :

arms :

back :

seat :

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

size : $\{10 - 100q\}$ material : {} cost :

Chair Arms

cost :

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

material : {}

size: {0 - 50q}

Cost per gram \$0.01 \$0.05 \$0.10

Materials Table

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

Chair mass :>200g cost :<\$20 legs : seat :

arms : back : Chair Arms

Chair Legs count: 4 **size** : $\{5 - 50g\}$ material : {} cost: Chair Seat

size : $\{10 - 100q\}$ material : {} cost :

size : $\{0 - 50q\}$

material : {} cost : Chair Back

size : $\{10 - 100g\}$ material : {} cost :

Marenais Table	
Material	Cost per gram
Plastic	\$0.01
Wood	\$0.05
Metal	\$0.10
	•

Matarials Table

Order:

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

Chair mass :>200g

cost :<\$20 legs :

seat :

arms : back : Chair Legs count: 4 **size** : {5 - 50q} material : {} cost : <\$5

size: {10 - 100q} material : {} cost : <\$5

Chair Seat

Chair Arms **size** : $\{0 - 50g\}$ material : {} cost : <\$5

Materials Table **Material** Cost per gram \$0.01 Plastic \$0.05 Wood Metal \$0.10

Chair Back **size** : {10 - 100q} material : {} cost : <\$5

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

Chair
mass :>200g
cost :<\$20
legs :
seat :</pre>

arms : • back : •

Materials Table		
Material	Cost per gram	
Plastic	\$0.01	
Wood	\$0.05	
Metal	\$0.10	

Chair Arms
size: {0 - 50g}
material: {}
cost: <\$5

material : {}

cost : <\$5

Chair Legs

count: 4

cost : \$5

Chair Seat

size : 25q

material : wood

size: {10 - 100g}

Chair Back
 size : {10 - 100g}
 material : {}
 cost : <\$5</pre>

Order:

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

Chair mass :>200g

cost :<\$20 legs :

seat : arms :

back :

Chair Legs count: 4 size : 25g material: wood cost: \$5.00

size : 50qmaterial : metal cost: \$5.00

Chair Seat

Chair Arms size : 50qmaterial : metal cost: \$5.00

Chair Back size : 50qmaterial : metal cost: \$5.00

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.

Chair

mass : 250g cost : \$20

legs : seat :

arms :

back :

Chair Legs count: 4 size : 25g material : wood cost: \$5.00

size : 50qmaterial : metal cost: \$5.00

Chair Seat

Chair Arms

size : 50qmaterial : metal cost: \$5.00

Chair Back size : 50qmaterial : metal cost : \$5.00

Material	Cost per gram
Plastic	\$0.01
Wood	\$0.05

Materials Table

Metal

CU.UQ \$0.10

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

Chair mass : 160q cost : \$16 legs seat :

arms : back :

cost : \$10.00

Chair Seat

Chair Legs

size : 10g

cost: \$4.00

material : metal

count

size : 100g material : metal

Materials Table

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

Chair Arms size : Oq

material : N/A cost : \$0.00

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

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

Chair mass:

cost :<\$16 legs :

seat :

arms : back : Chair Seat size : 100g material : metal

Chair Arms

Chair Legs

cost :

cost : \$10.00

size : $\{0 - 50q\}$

count : {3, 4, 5}

size : $\{5 - 50g\}$

material : {}

Materials Table **Material** Cost per gram \$0.01 Plastic \$0.05 Wood \$0.10 Metal

material : {} cost: Chair Back

size : {10 - 100q} material : {} cost :

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

Chair mass: legs : seat :

cost :<\$16

arms :

back :

Chair Seat size : 100g material : metal

Chair Arms

Chair Legs

cost :

cost : \$10.00

count : {3, 4, 5}

size : $\{5 - 50g\}$

material : {}

Materials Table **Material** Cost per gram \$0.01 Plastic \$0.05 Wood \$0.10 Metal

size : Og material: N/A cost : \$0.00

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

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

Chair mass: legs : seat :

cost :<\$16

arms :

back :

Chair Legs count: 4 size : 10qmaterial : metal cost: \$4.00

size : 100g material : metal cost : \$10.00

Materials Table **Material** Cost per gram \$0.01 Plastic \$0.05 Wood \$0.10 Metal

material: N/A cost : \$0.00 Chair Back **size**: {10 - 100q} material : {}

Chair Seat

Chair Arms

cost :

size : Og

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

Chair
mass :
 cost :<\$16
 legs :
 seat :</pre>

arms :

back :

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

Chair Seat

Chair Arms

size : Og

size : 100g
material : metal
cost : \$10.00

Materials Table

Material Cost per gram

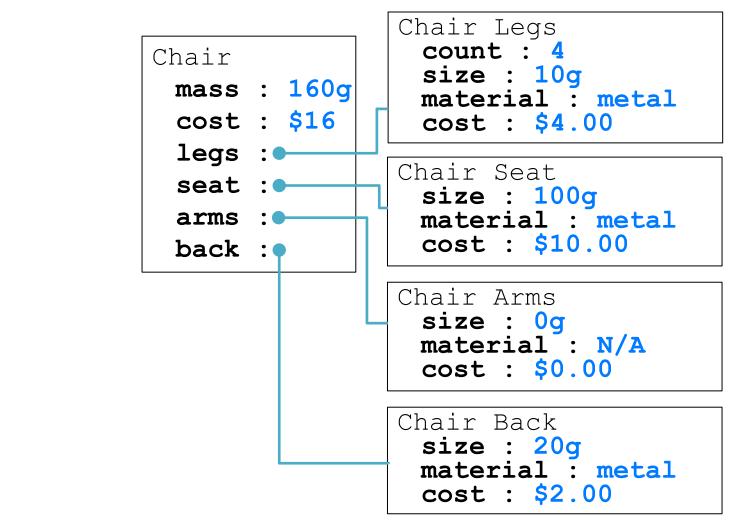
Plastic \$0.01

Wood \$0.05

Metal \$0.10

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.

Reptile

Eagle

Vertebrate

Bird

Bluebird

Mammal

Penguin



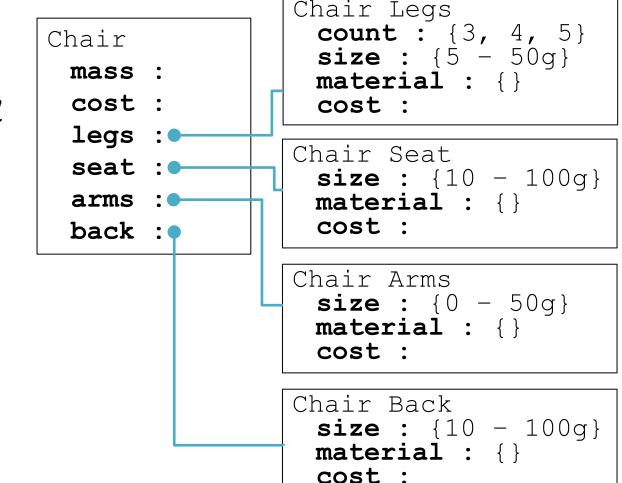
Chair Arms

size : Og



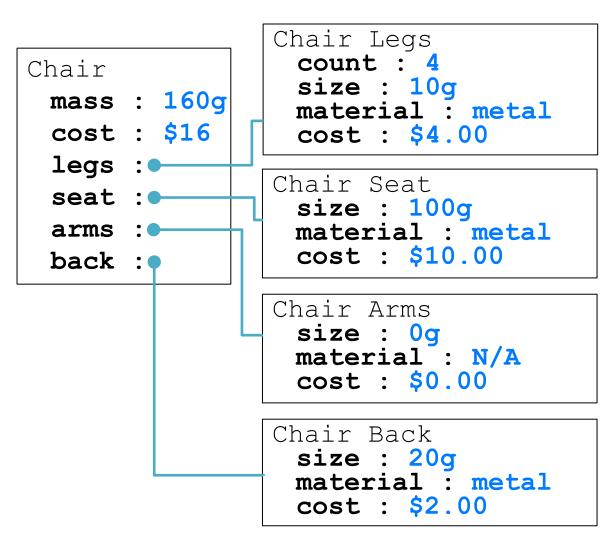
material: N/A

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

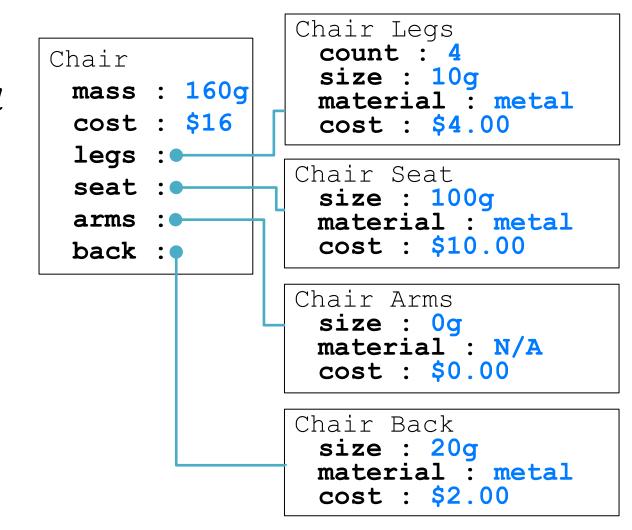


Configuration suggests starting with a prototype concept and assigning values to variables.

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.



How would you use configuration to design an agent that

could answer Raven's progressive matrices?

Assignment

To recap...

- Design
- Defining configuration
- Process of configuration

- Connections to earlier topics