GROUPING

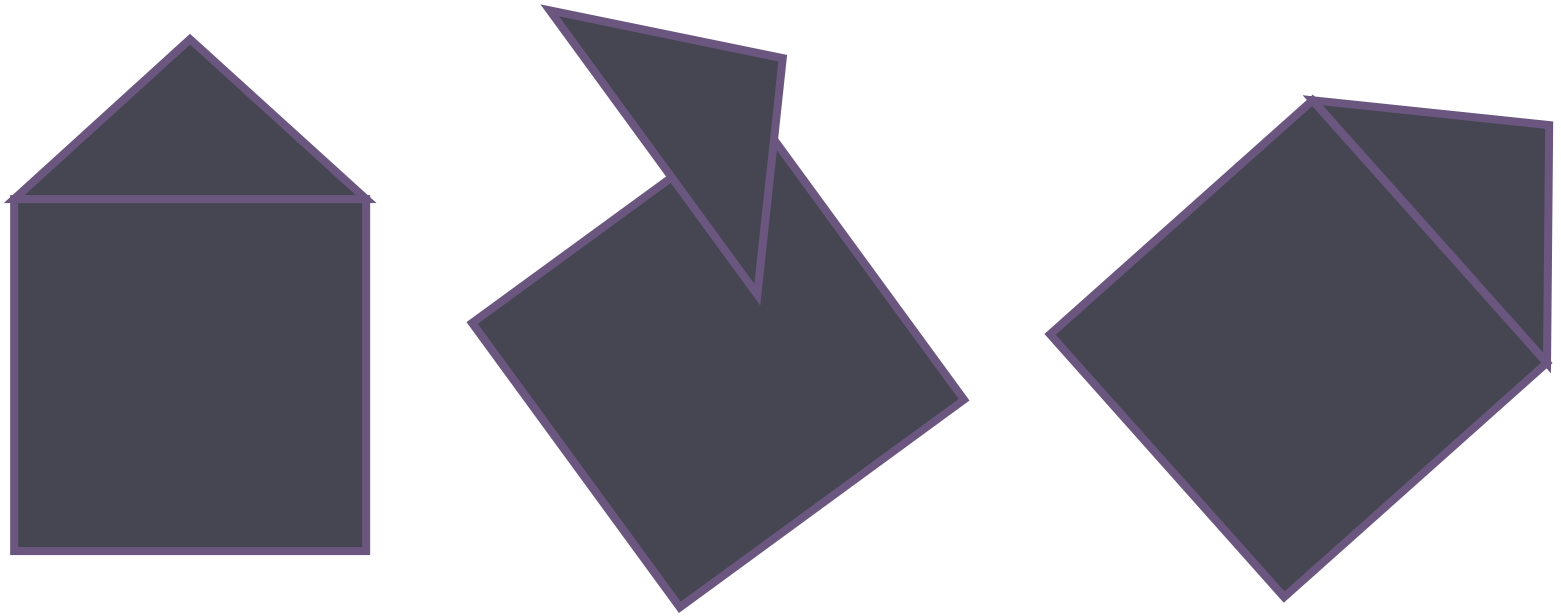
CMPT 381

Context: user interactions

- Handles
- Interactive object creation
- Selection
- User-controlled transformation
- Snapping
- Grouping

Grouping

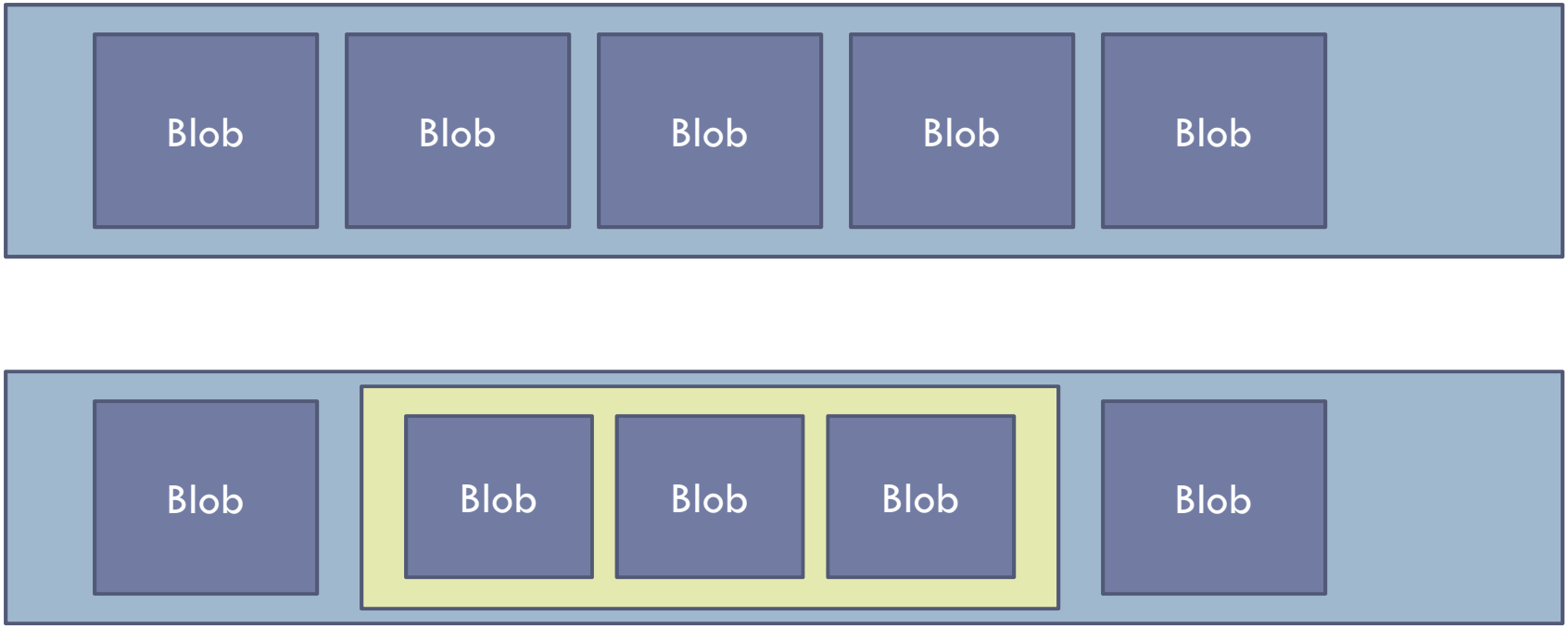
- Allows manipulation of composite objects
  - Some objects need grouping for correct transformation
- View organized into a hierarchy
  - Assists with selection, transformation, duplication



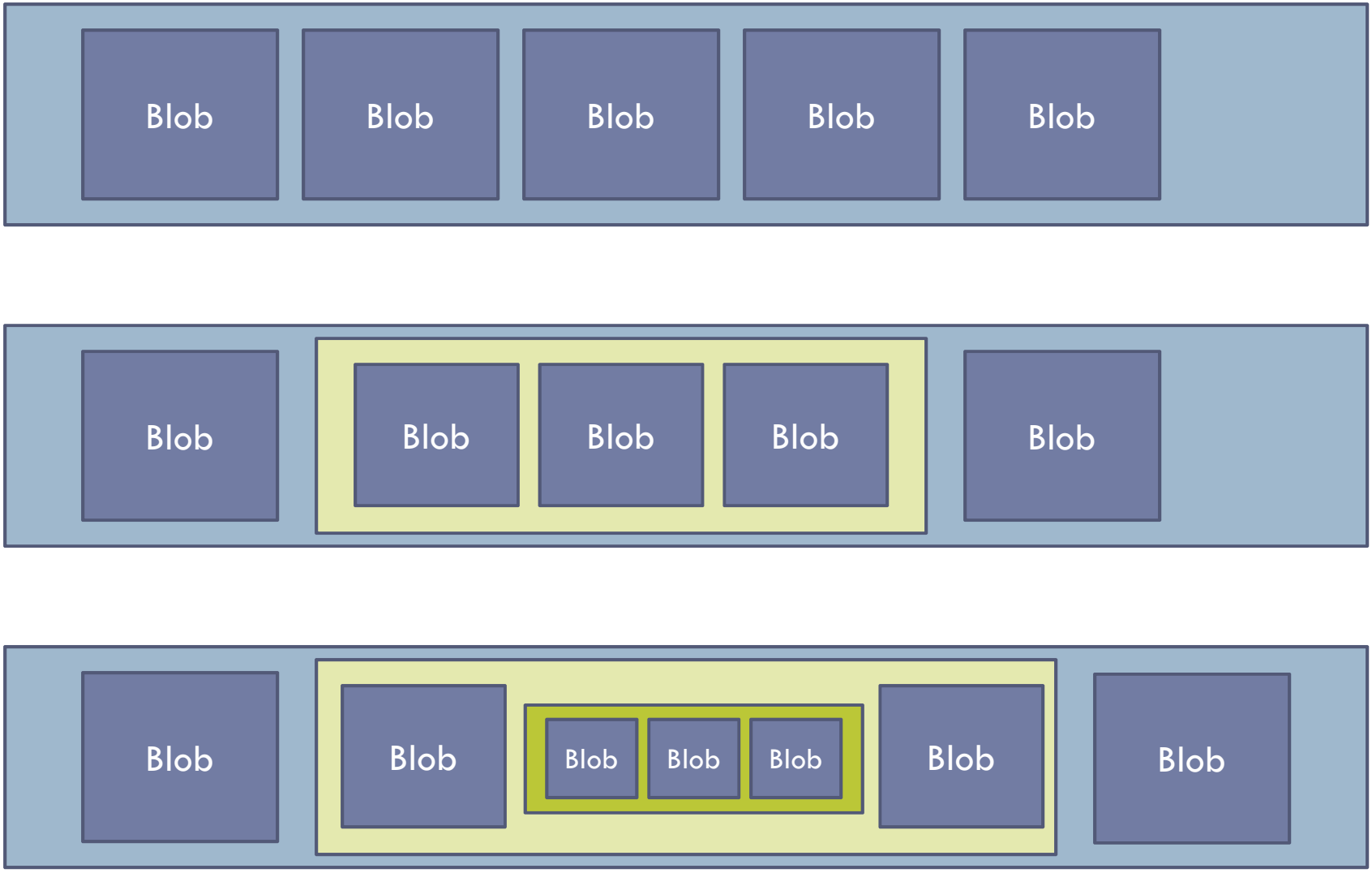
Grouping and MVC

- What is a group?
- How to represent and store groups?
- In original BlobModel:
  - Objects stored as ArrayList of type Blob
- Need a structure that can store hierarchy
  - Groupable interface
  - Group class
  - How to store Blob objects?

Group structure



Group structure



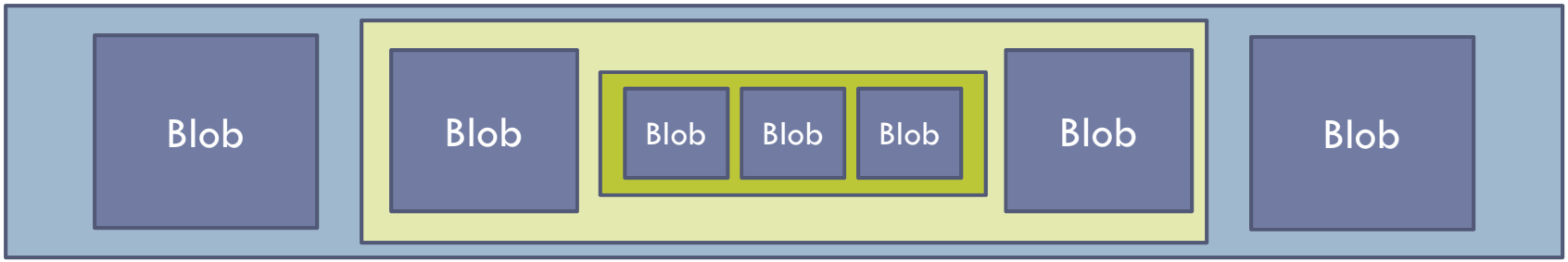
In code

- We need to store a hierarchy
  - Any item can be either a group or a blob
- Polymorphism
  - Lets different classes appear to be the same type
  - Lets us store groups and blobs in the same collection
  - Can use either abstract classes or interfaces
- Groupable interface
  - Specifies common methods for both groups and blobs
  - Model now stores ArrayList<Groupable>

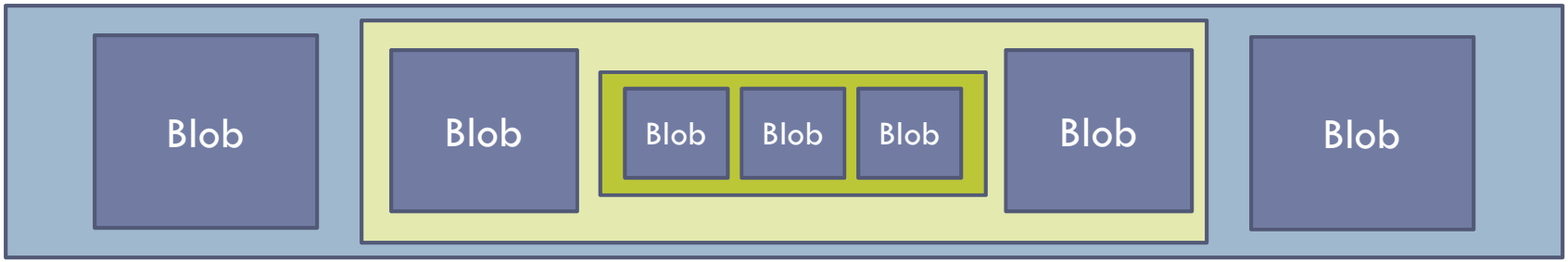
In code

- Group class
  - Implements Groupable
  - Keeps a list of children (also ArrayList<Groupable>)
- Blob class
  - Implements Groupable
  - No children (leaf node)

Draw the tree for this case:



Draw the tree for this case:



ArrayList<Groupable> {Blob, Group, Blob}

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Groupable interface

```
boolean hasChildren();
ArrayList<Groupable> getChildren();
boolean contains(double x, double y);
boolean isContained(double x1, double y1, double x2, double y2);
void draw(GraphicsContext gc, boolean selected);
void move(double dx, double dy);
double getLeft();   // bounding box of the group
double getRight();
double getTop();
double getBottom();
void setZ(int newZ);  // Z-order for the group
int getZ();
```

How to do transforms on a group?

- All shapes transformed relative to parent
  - (not relative to window)
- dx / dy also relative to parent
  - Represented as a proportion of the overall size of the grouped shape