

An Object-based World Model and its Uses



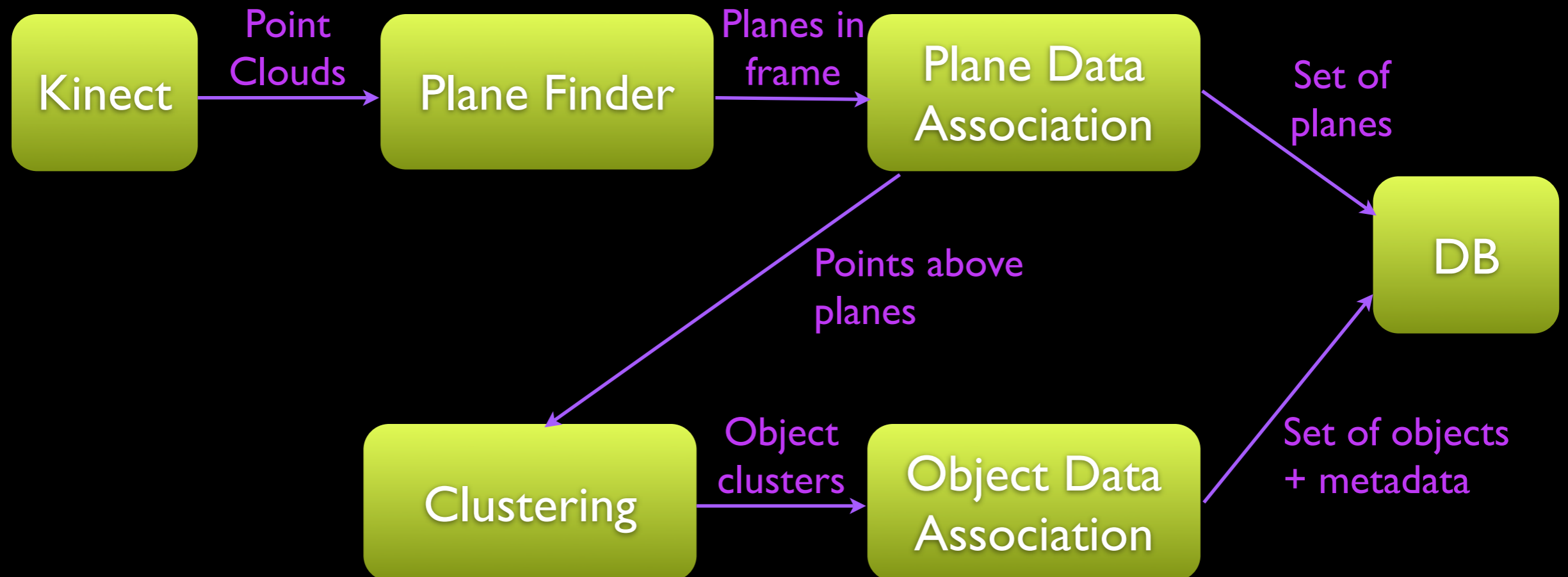
Mac Mason



Bhaskara Marthi

“I just want a robot that keeps track of my stuff”
- Aditi Nabar (spouse)

Pipeline



Implementation

- PR2 + Kinect
- ROS, PCL, Nav stack
- MongoDB for storing info
 - Binary blobs + metadata (color, shape, ...)
 - Partition by run
 - Efficient queries over location, attributes













Data Association

- Match within runs based on spatial overlap
- Don't commit to matches across runs
- Discover likely matches at query time

Attribute perception

- No object categories or instances
- Instead, extract descriptive features

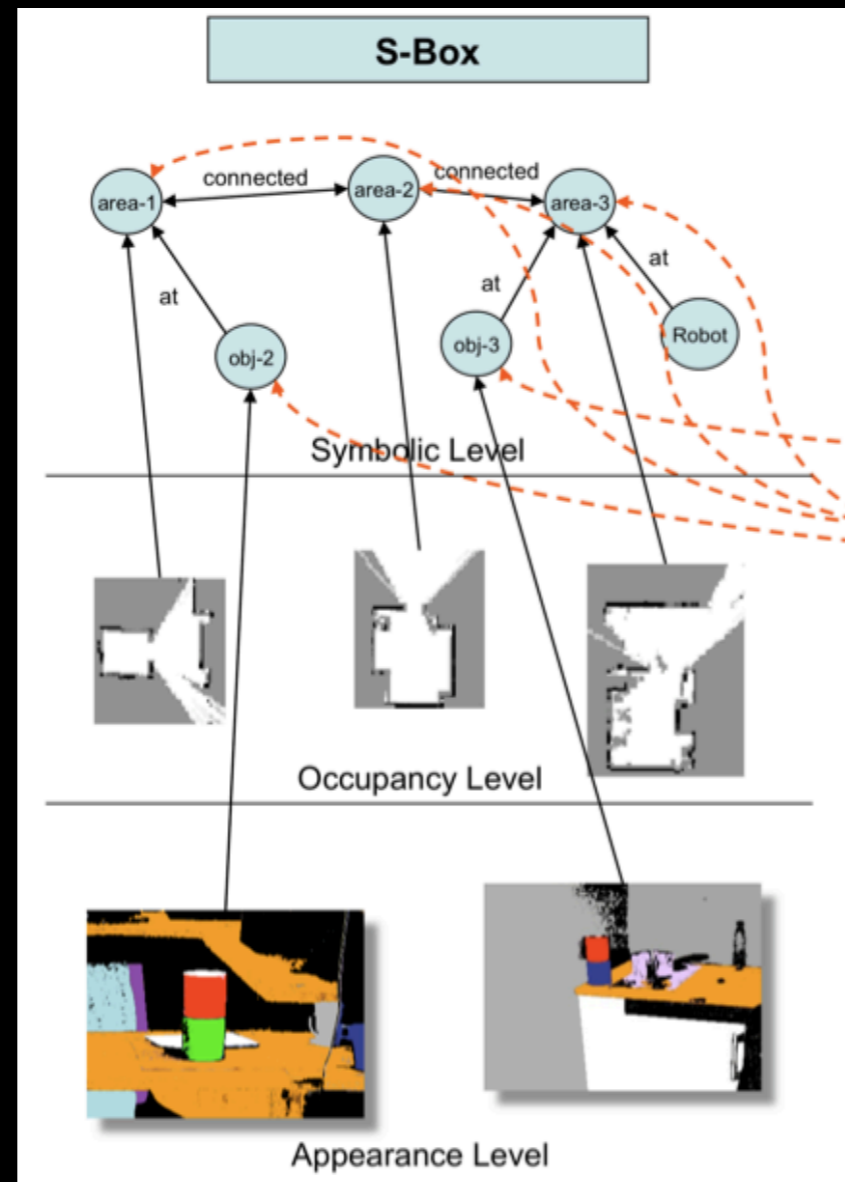


Color: Red
Shape: Cylinder
Diameter: 0.1m

Sensors to symbols

- Sensor level
 - Point clouds, images,
 - Normals, SIFT features, ...
- Symbolic level: objects, categories, relations
- How to connect?

Bridging the gap



[Galindo et al, 2008]

Reify Geometry

- Surfaces, clusters, cluttered regions, ...
- Color, shape, topology, ...
- A lot can be done at this level!

Conclusions

- Object-based world model
- Allows
 - Change detection
 - Semantic querying
- Robust to noisy perception

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Thank you!