ROS MoveIt

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Outlook

- Motivation

Motivation

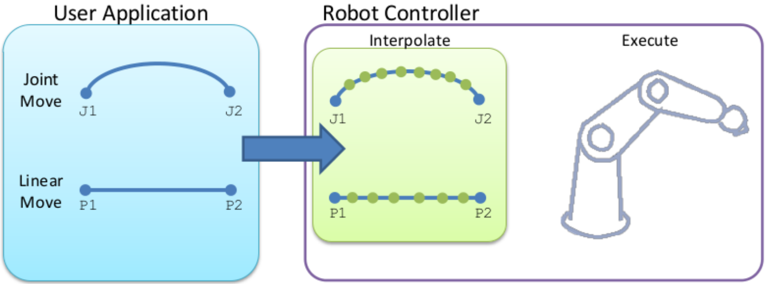
Task

Provide a high level abstraction to perform motion planning for robot arms including collision avoidance.

Options:

- Implement your own IK Solver
- Try to forward desired poses to hardware onboard IK Solvers and stop on collision

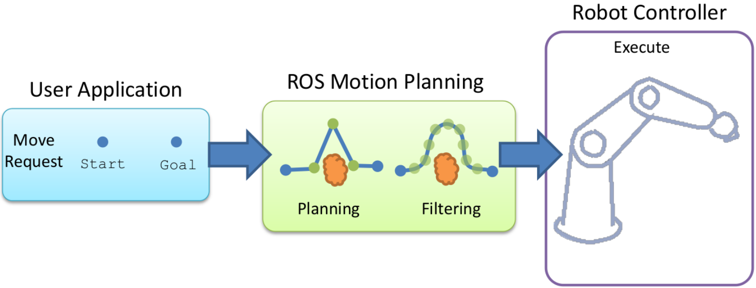
Classic robot programming



Source: http://aeswiki.datasys.swri.edu

- Motion Types: limited, but well-defined. One motion task.
- Environemnt Model: none
- Execution Monitor: application-specific

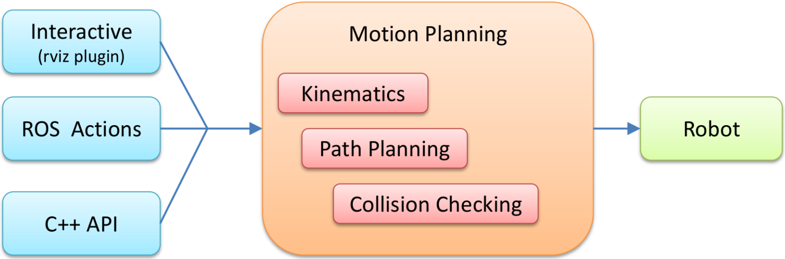
ROS MoveIt planning concepts



Source: http://aeswiki.datasys.swri.edu

- Motion Types: flexible, goal-driven, with constraints.
- Environemnt Model: automatic, based on live sensor feedback
- Execution Monitor: detects changes during motion

ROS MoveIt planning components



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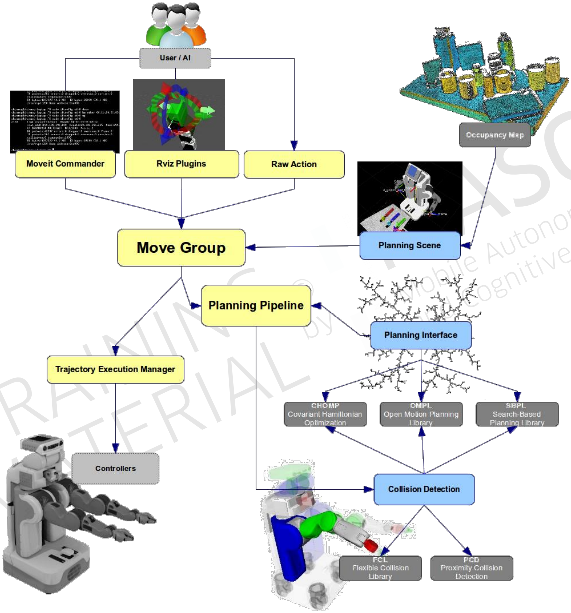
User / AI
Moveit Commander
Rviz Plugins
Raw Action
Occupancy Map
Planning Scene
Move Group
Planning Pipeline
Planning Interface
Trajectory Execution Manager
CHOMP
Covariant Hamiltonian Optimization
OMPL
Open Motion Planning Library
SBPL
Search-Based Planning Library
Controllers
Collision Detection
FCL
Flexible Collision Library
PCD
Proximity Collision Detection

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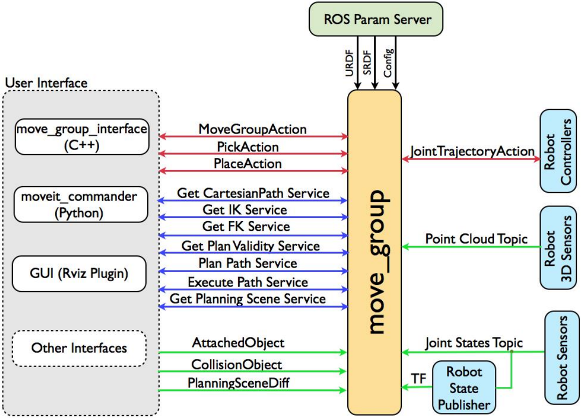
ROS MoveIt nodes



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Robot integration

A MoveIt Package...

- includes all required nodes, config, launch files
  - motion planning, filtering, collision detection, etc.
- is unique to each individual robot model
  - includes reference to URDF information
- uses a standard interface to robots
  - publish trajectory, listen to joint angles
  - similar to move_base publishing velocity commands and observing localisation
- can (optionally) include workcell geometry
  - e.g. for collision checking

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