



# LAMSS

## MOOS-IvP Simulation Environment

### A Tutorial



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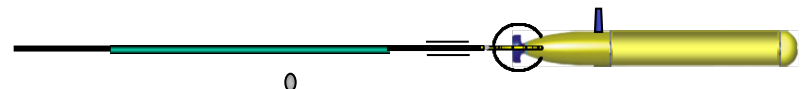


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# Outline

- LAMSS hybrid at-sea/virtual undersea network environment
- Configuration management
- Configuration recipe
  - Cruise
  - Nodes
  - Sensors
- Launching platforms
  - Topside
  - AUV
  - Kayak ASC



# MOOS-DAWG'11 Virtual Experiment Boston Harbor Anchoring Area

pMarineViewer

File BackView GeoAttr Vehicles MOOS-Scope ClearHistory

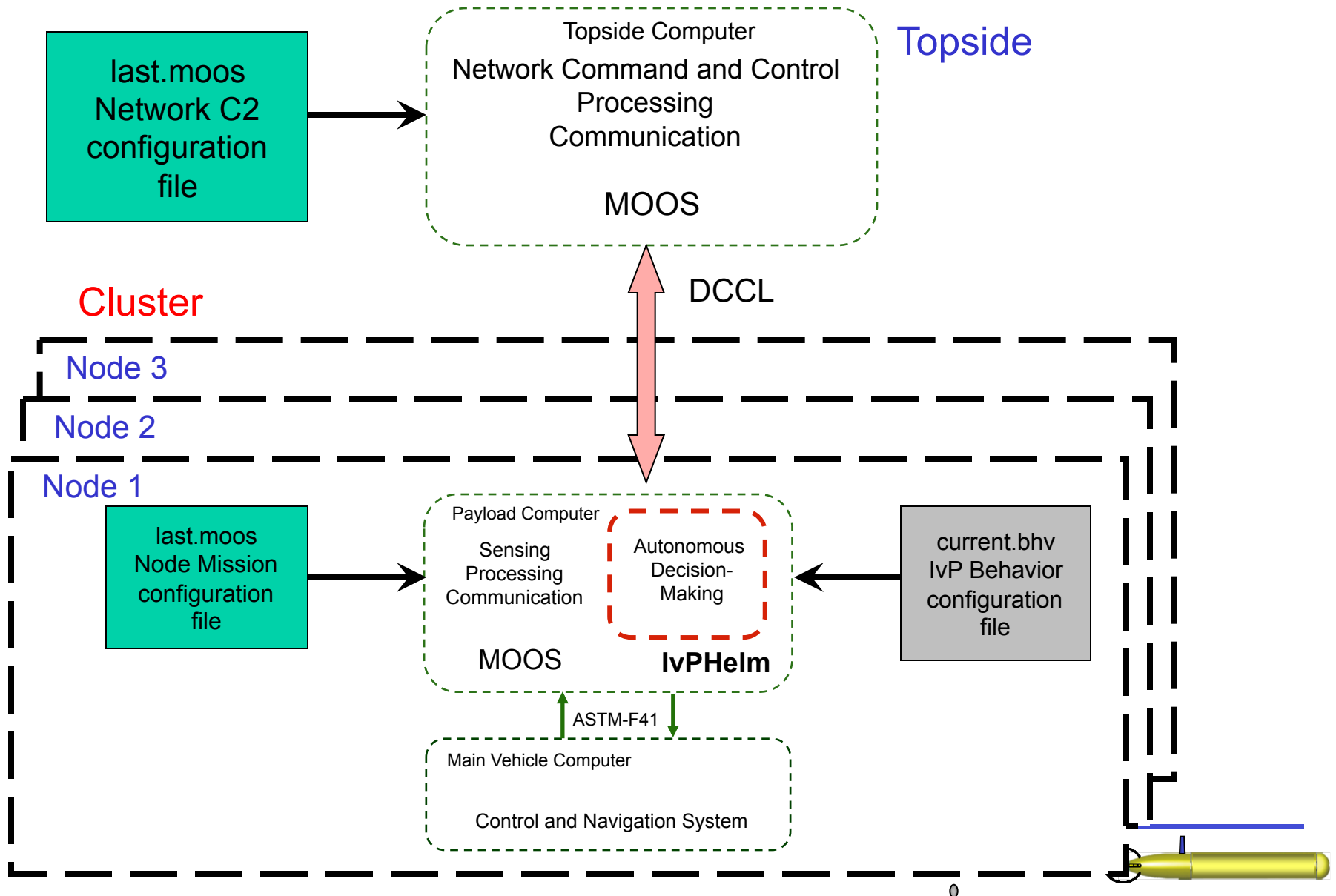
resolution discover resolution  
resolution discover resolution  
resolution discover resolution  
resolution discover resolution  
resolution discover resolution

VName: resolution X(m): 6775.0 Lat: 42.337803 Spd(m/s): 0.0 Dep(m): 0.0 Time: 636.2  
VType: ship Y(m): 4040.0 Long: -70.968990 Heading: 119.2 Report-Age: 5.06 Warp: 1  
Variable: n/a Time: n/a Value: To add Scope Variables: SCOPE=VARNAME in the MOOS config block



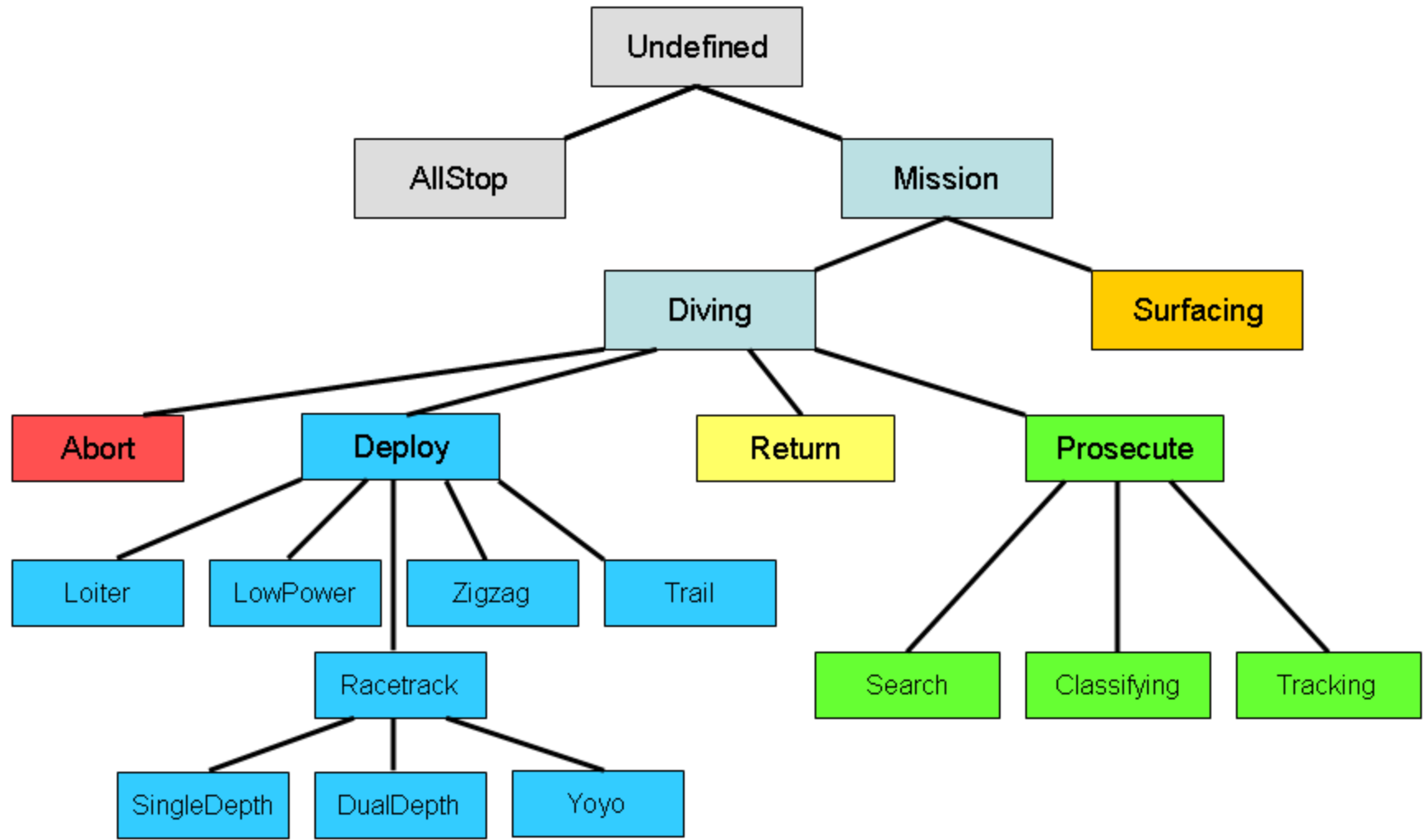
# LAMSS - MOOS-IvP

## At-sea/Virtual Undersea Network Architecture

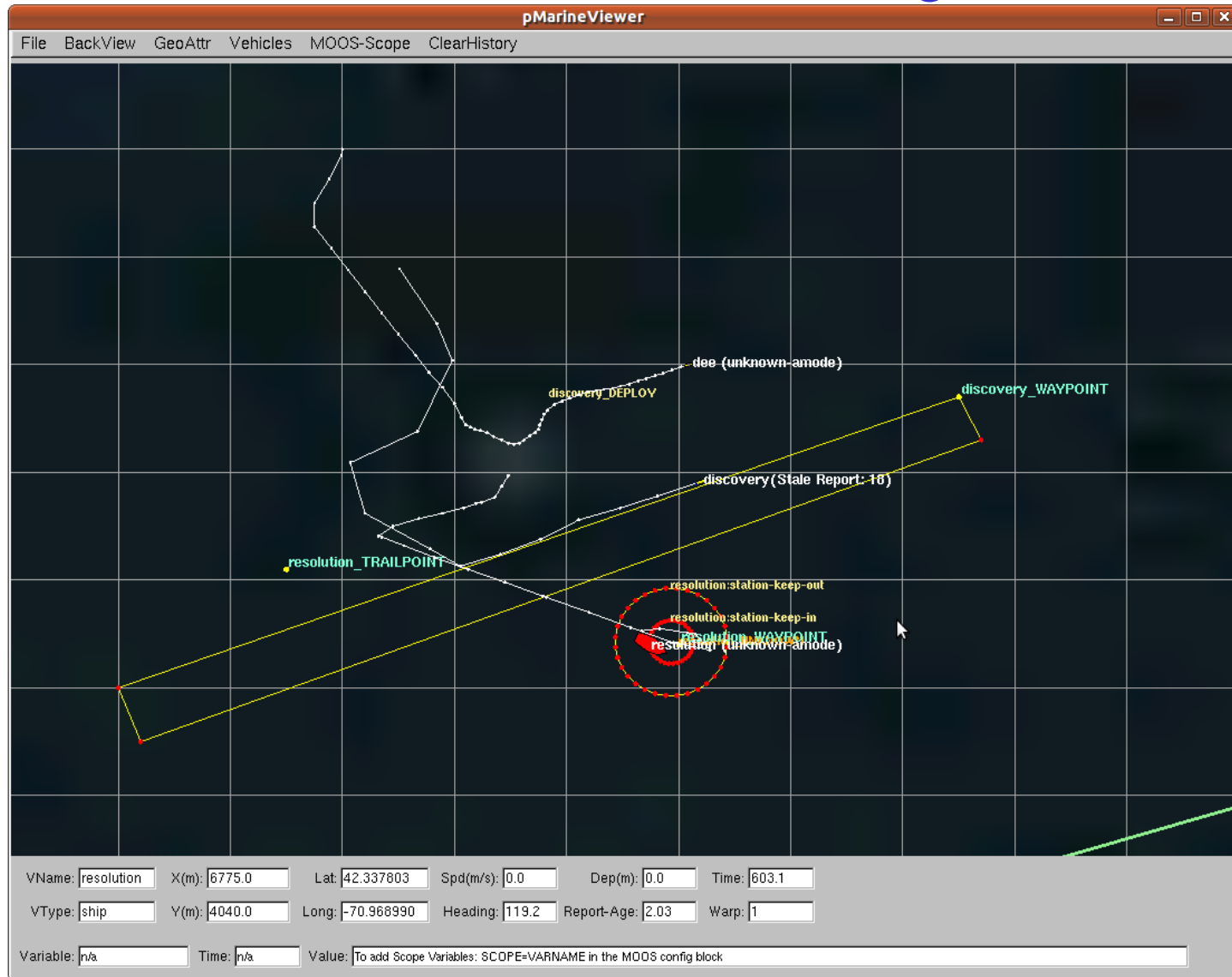


# LAMSS - MOOS-IvP

## Hierarchical IvP Mode Definition

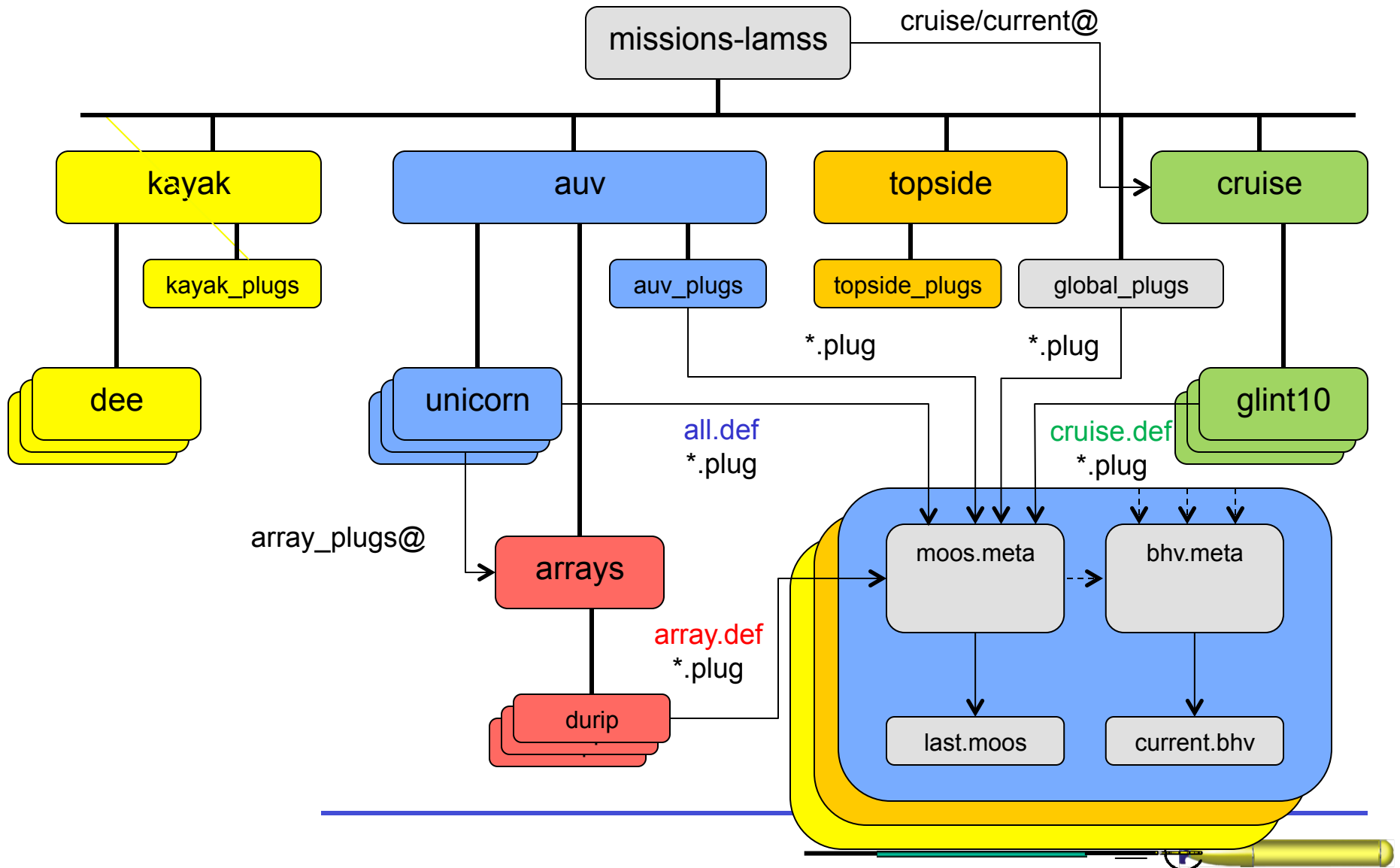


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# LAMSS - MOOS-IvP

## Mission Configuration Management



# Cruise Configuration Recipe

- Create missions-lamss/cruise/new\_cruise
  - Copy content of similar cruise folder
- Edit configuration files:
  - `new_cruise/cruise.def`
    - Operational bounding box
    - Fixed obstacles
    - Environmental parameters
  - `new_cruise/datum.plug`
  - `new_cruise/data/modemidlookup.txt`
  - `pMarineViewer.plug`
    - Background picture
    - Edit `new_cruise/pMarineViewer.plug`
  - `bhv_*.plug`
    - Cruise-specific behaviors: Obstacle avoidance, Collision avoidance
- Define current cruise in missions-lamss
  - `./cruise_config.sh new_cruise`





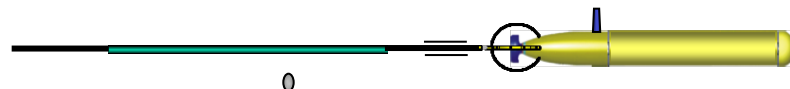
# AUV Configuration Recipe

- Enter vehicle folder, e.g. missions-lamss/auv/discovery
- Define acoustic array mounted on vehicle, if any.
  - `./array_config.sh durip`
- Edit configuration files:
  - `all.def`
    - MOOS community, port, modem-id etc
    - ACOMMS configuration
  - `discovery_plugs/*.plug`
    - Vehicle-specific moos and bhv plugs in `discovery_plugs`
  - `moos.meta`
    - MOOS processes active at runtime, simulation and common
  - `bhv.meta`
    - Define behavior modes and behavior configuration
  - `array_plugs/array.def`
    - Acoustic array and processing configuration – frequencies, active elements etc.



# Launching Topside

- select topside desktop
- Enter topside folder missions-lamss/topside
- Launch topside
  - `./simulation_launch.sh $FLAGS`
- FLAGS:
  - `hw_modem` Use actual modem hardware instead of simulator
  - `poll` Topside will control acomms network through centralized polling (default)
  - `no_poll` No polling by topside
  - `auto_mac` Slotted acomms scheme with auto discovery
  - `fixed_mac` Fixed slotted Mac scheme for acomms
  - `ship` Topside simulated as ship-based, with ivP-helm control
  - `bridge_messages` Bridge acomms messages to selected gateway kayak defined by `$(KAYAK)`.
- Launch matlab display tools
  - `cd misc; matlab`
    - `geo_convert.m`
    - `tloss_display.m`



# Launching AUV discovery

- select discovery desktop
- Enter discovery folder missions-lamss/auv/discovery
- Launch auv
  - `./simulation_launch.sh $FLAGS`
- FLAGS:
  - `hw_modem, *_mac` ACOMMS flags consistent with topside
  - `passive` Run passive sonar simulator
  - `active` Run active sonar simulator
  - `bearingsim` Low-fidelity target bearing simulator
  - `arraysim` run passive acoustic array simulator without bearing tracker. Used together with `bearingsim`.
  - `lbl_sim` Run lbl network simulator.
  - `mseas` Use MSEAS modeled ocean environment
- Launch matlab display tools
  - `cd misc; matlab`
    - `small_uVis.m`



# Launching Kayak dee

- select discovery desktop
- Enter discovery folder missions-lamss/auv/discovery
- Launch auv
  - `./simulation_launch.sh $FLAGS`
- FLAGS:
  - `hw_modem` Use actual modem hardware instead of simulator
  - `poll` kayak will act as ACOMMS gateway and control network by polling
  - `no_poll` No polling by kayak (default)
  - `auto_mac` Slotted acomms scheme with auto discovery
  - `fixed_mac` Fixed slotted Mac scheme for acomms
  - `bridge_messages` Bridge acomms messages to topside, simulating wifi connection.



# LAMSS - MOOS-IvP

## Hierarchical Configuration Management

