Asteroid Exploration System Command Language

The document provides an example command language for Asteroid Exploration Mission Management.

The document includes commands for:

- defining and updating asteroids
- defining spacecraft
- defining missions
- updating mission control resources
- simulating spacecraft messages

Asteroid Commands

This section defines commands for creating and updating Asteroid information.

***Identifier**: the given unique identifier for the asteroid (e.g. 1 Ceres, 4 Vesta, 433 Eros, etc),*
***Notes**: description and other notes about the asteroid. Notes can be added over time. Notes have a date, author and text.*
***Exploration Status**:*
    ***Minerals found, estimated mass, accessibility** (e.g. platinum, 20 metric tons, surface deposit).*
    ***Water found, quantity, state** (e.g. yes, 20 million liters, ice)*
    ***Life** (none, single cell organisms, multi cell, intelligent, friendly)*
***Asteroid Type** (C-Type, M-Type, S-Type, Innerbelt comet)*
***Size**: width, length, height*
***Mass**: approximate mass*
***Surface Gravity**: gravitational field at surface*
***Aphelion**: furthest distance from Sun in AUs*
***Perihelion**: closest distance from Sun in AUs*

Commands

create_asteroid, <asteroid_identifier>, <asteroid_type>, <width>, <length>, <height>, <mass>, <gravity>, <aphelion>, <perihelion>

add_asteroid_note, <asteroid_identifer>, <date>, <author>, <text>

add_asteroid_mineral_discovery, <asteroid_identifer>, <mineral>, <estimated_mass>, <deposit_type>

add_asteroid_water_discovery, <asteroid_identifer>, <water_found>, <amount>, <state>

add_asteroid_life_discovery, <asteroid_identifer>, <life_type>, <intelligent>, <friendly>

Examples

create_asteroid, 1 Ceres, G_TYPE, 1000, 1000, 1000, $9.43 \pm 0.07 \times 10^{20}$, 0.028, 2.9858 , 2.5468

add_asteroid_note, 1 Ceres, 11-27-2013, eric, potential source of water for rocket fuel

add_asteroid_mineral_discovery, 1 Ceres, titanium, 1000000, surface

add_asteroid_water_discovery, 1 Ceres, true, 100000000, ice

add_asteroid_life_discovery, 1 Ceres, multi_cell, true, true

Spacecraft Commands

This section defines commands for creating and updating Spacecraft information.

Each spacecraft has the following set of attributes:
Identifier*: unique spacecraft call sign*
Launch Date*: date of launch*
Mission: *mission identifier*
Type *(Explorer, Miner)*
Status
    Fuel *(% remaining)*
    Systems
        Guidance *(OK, Not OK)*
        Communication Link *(OK, Not OK)*
    State *(waiting for launch, in route, lost, crashed, landed, exploring, mining, homeward bound, malfunction)*
Location *(AUs from Sun)*
Destination *(target Asteroid identifier)*

Command

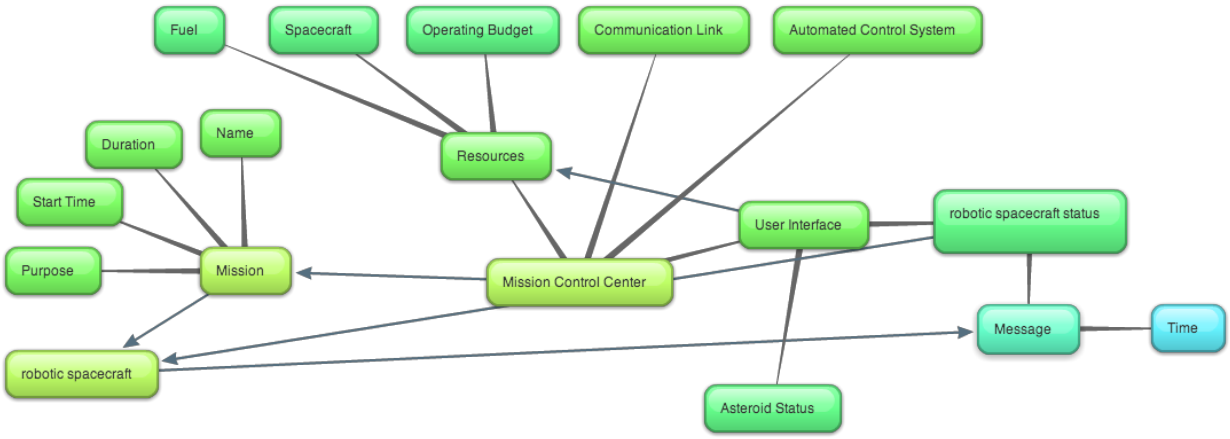
create_spacecraft, <spacecraft_identifier>, <launch_date>, <mission_identifier>, <spacecraft_type>, <fuel_level>, <guidance_status>, <communication_status>, <state>, <location>, <target_asteroid_identifier>

Example

create_spacecraft, Ceres Explorer Spacecraft, 12/1/2015, Ceres Explorer Mission, explorer, 100, OK, OK, waiting_for_launch, 1, 1 Ceres

Mission Management Commands

This section defines commands for mission management.



unique id *for mission*
name *of mission (e.g. "sling shot"),*
purpose *of mission (e.g search for water)*
spacecraft *id of fully provisioned spacecraft that will perform the mission*
launch date *(start time)*
eta*, estimated time of arrival*
destination: *the destination asteroid for the the Mission*
status*: (waiting for launch, in progress, complete, aborted)*

Commands

create_mission, <mission_identifier>, <mission_name>, <mission_purpose>, <spacecraft_identifier>, <launch_date>, <eta>, <target_asteroid_identifier>, <mission_state>

increment_fuel_resource <amount>
increment_spacecraft_resource <amount>
increment_operating_budge <amount>
set_communicaiton_link_status <status>
set_automated_control_system_status <status>

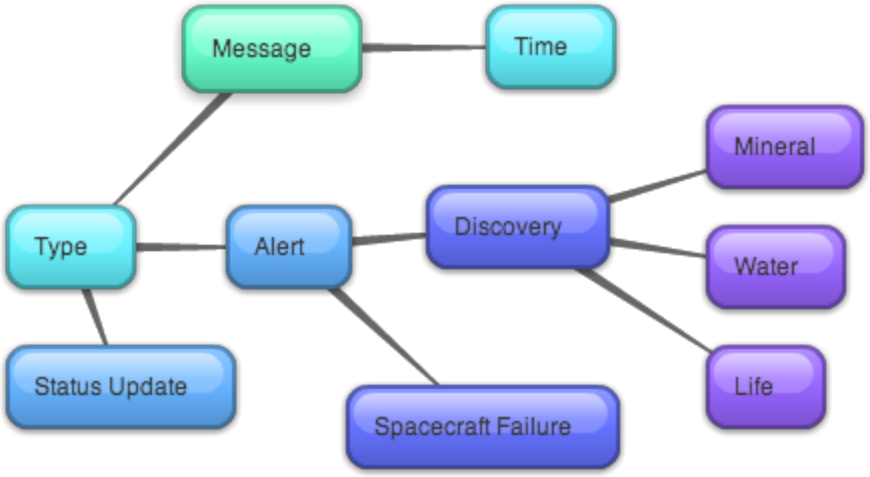
Examples

create_mission, Ceres Explorer Mission 1, Ceres Explorer Mission 1, Explore Ceres and locate best location to retrieve water, Ceres Explorer Spacecraft, 12/1/2013, 12/1/2015, 1 Ceres, waiting for launch

increment_fuel_resource -1000
increment_spacecraft_resource -1
increment_operating_budge -1000000
set_communicaiton_link_status OK
set_automated_control_system_status NOT_OK

Simulating Spacecraft Messages

This section defines commands for simulating spacecraft messages.



Commands

create_spacecraft_status_message, <spacecraft_identifier>, <timestamp>, <mission_identifier>, <spacecraft_type>, <fuel_level>, <guidance_status>, <communication_status>, <state>, <location>, <target_asteroid_identifier>

create_spacecraft_fault_alert_message, <spacecraft_identifier>, <timestamp>, <failure_type>

create_spacecraft_mineral_discovery_message, <spacecraft_identifier>, <timestamp>, <asteroid_identifer>, <mineral>, <estimated_mass>, <deposit_type>

create_spacecraft_water_discovery_message, <spacecraft_identifier>, <timestamp>, <asteroid_identifer>, <water_found>, <amount>, <state>

create_spacecraft_life_discovery_message, <spacecraft_identifier>, <timestamp>, <asteroid_identifer>, <life_type>, <intelligent>, <friendly>

Examples

create_spacecraft_status_message, Ceres Explorer Spacecraft, 2014:7:1::15:01, Ceres Explorer Mission 1, explorer, 80%, OK, OK, in_route, 1.4, 1 Ceres

create_spacecraft_fault_alert_message, Ceres Explorer Spacecraft, 2014:7:1::15:01, solar_panel_damaged

create_spacecraft_mineral_discovery_message, Ceres Explorer Spacecraft, 2014:7:1::15:01, 1 Ceres, titanium, 1000000, surface_deposite

create_spacecraft_water_discovery_message, Ceres Explorer Spacecraft, 2014:7:1::15:01, 1 Ceres, true, 1000000, ice

create_spacecraft_life_discovery_message, Ceres Explorer Spacecraft, 2014:7:1::15:01, 1 Ceres, multi_cell, true, true