



The fallen armies lead by Horus  
Lupercal are on their way to conquer the  
Imperial Land.

As the traitor army gets closer,  
the loyal planets are falling into  
darkness around the Solar System.

The last hope is in those loyal  
starships that are gathering around  
the Solar System's planets ...

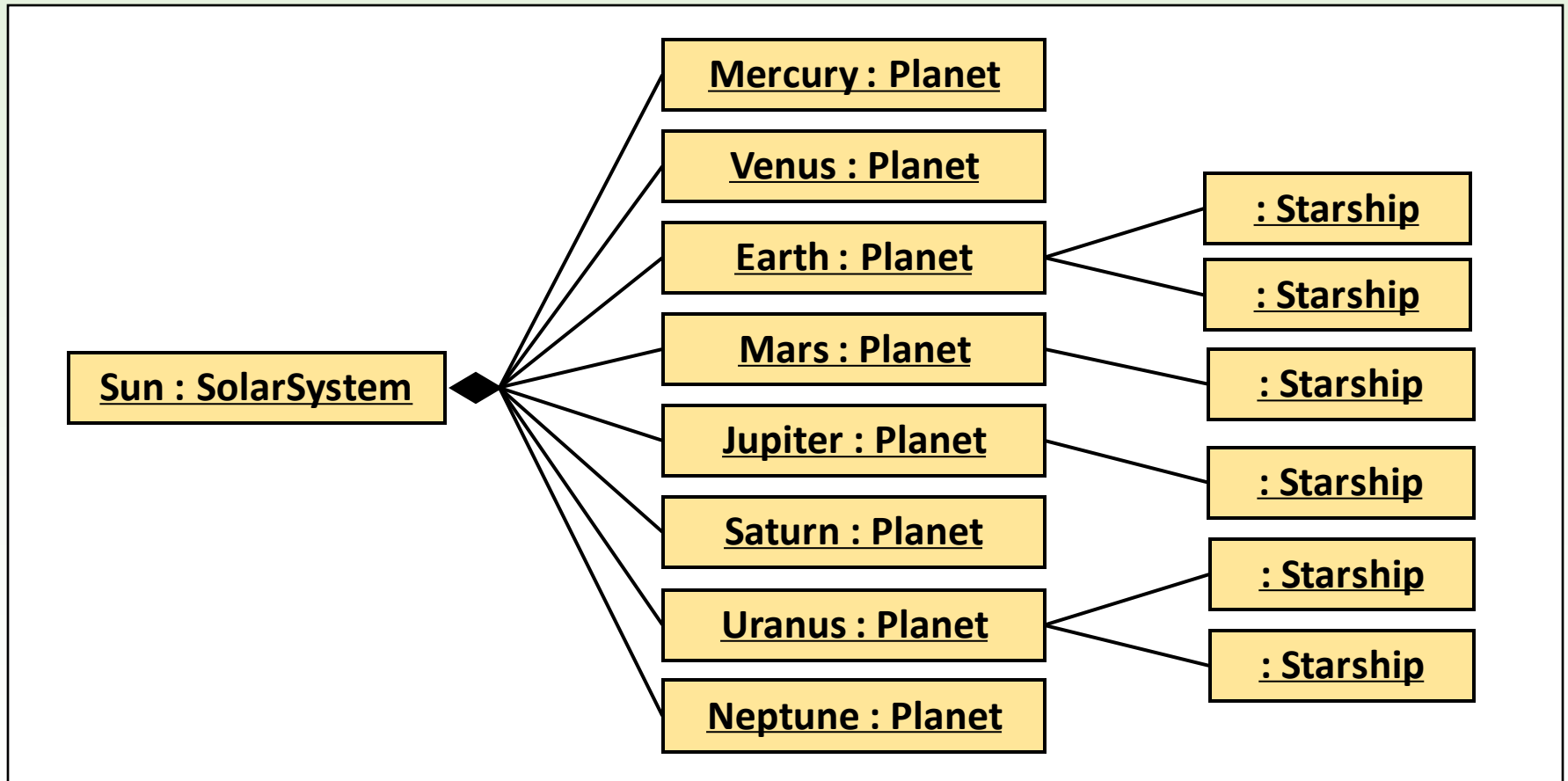
# Star Wars

A starship has a name. If it protects a planet, the planet is also known. It has 3 properties: its armour (natural number), its shield (natural number), and the number of guardsmen on the ship. There are 3 types of ship: the destroyer, the transport, and the ironclad. The power of a ship depends on its type and its properties:

- The destroyer' power is given as the half of its shield.
- The transport's power means the number of guardsmen on it.
- The ironclad' power means its armour.

1. Find the ship with the greatest power in the Solar System!
2. List all the unprotected planets!
3. Give the total shield of the ships guarding a given planet!

# Star Wars



# Star Wars

2nd component of p.MaxPower()

$(l, (. , \text{max}, \text{ship}), .) = \text{MAX}_{p \in \text{planets}} p.\text{MaxPower}()_2$   
 $p.\text{MaxPower}()_1$   
**return** (l, ship)

**return** SELECT e.ShipCount()=0  
 $e \in \text{planets}$

## SolarSystem

+ SolarSystem() { creating planets }  
 + MaxPowerShip() : bool×Starship {query}  
 + Unprotected() : Planet {query}

\* + planets

## Starship

# name : string  
 # armour : int {getter}  
 # shield : int  
 # guards : int  
 + Starship(string,int,int,int)  
 + Protect(p:Planet)  
 + Leave()  
 + Power() : real {virtual, query}

**if** planet ≠ null **then error endif**

planet := p  
 p.Protect(this)

\* prot ▶ 0..1  
 - ships # planet

## Planet

- name : string  
 + Planet( string)  
 + ShipCount() : int  
 + Protect(s:Starship)  
 + Leave(s:Starship)  
 + TotalShield() : real {query}  
 + MaxPower() : bool×real×Starship {query}

**return** |ships|

ships.Remov(s)

ships.Add(s)

**if** planet = null **then error endif**  
 planet.Leave(this)  
 planet := null

**return** MAX  $e \in \text{ships}$  e.Power()  
 true

**return**  $\sum_{e \in \text{ships}} e.\text{GetShield}()$

## Destroyer

+Power():real {override, query}

**return** shield/2

## Transport

+Power():real {override, query}

**return** guards

## Ironclad

+Power():real {override, query}

**return** armour