RackMonitor Guided Project

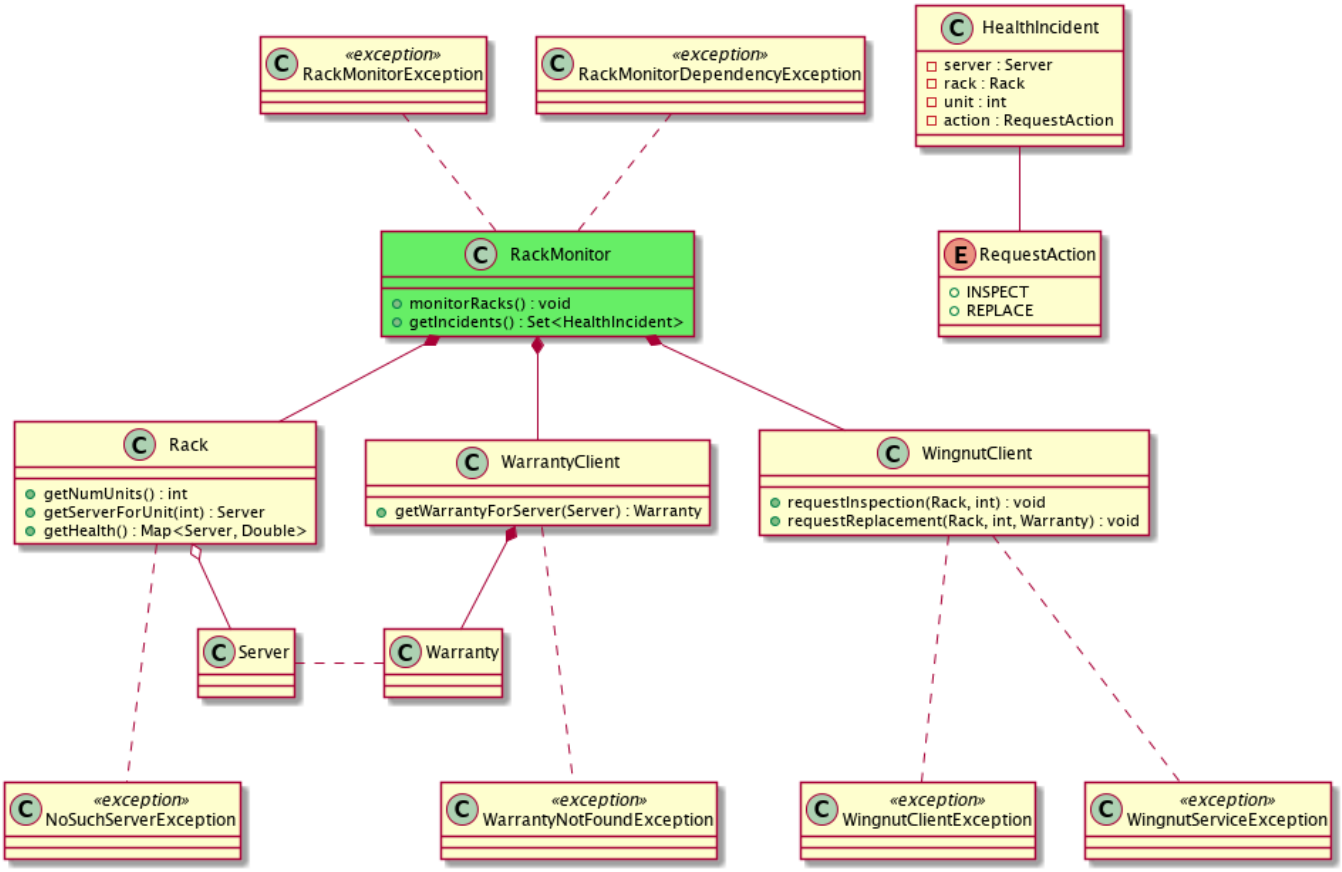
Introduction

Amazon needs lots of computers to run all those AWS services. Each computer is called a "server", and they stack 20 or 30 of them in a "rack". Then they put hundreds of racks in a data center, wire them together, and offer them to their customers.

Racks of servers in a (non-Amazon) data center

Each rack has sensors that report the power usage, temperature, and other metrics that indicate the health of its servers. Data centers periodically call a `RackMonitor` program, which checks if any server needs attention.

Here's a class diagram showing how `RackMonitor` works:



RackMonitor Class Diagram: `RackMonitor` gets `Server` health from `Rack`s, uses a `WarrantyClient` to look up the `Server`'s `Warranty`, and requests inspection or replacement through `WingnutClient`. It tracks its own requests through the `HealthIncident` class and `RequestAction` enumeration.

The data center calls `monitorRacks()` periodically. That calls `getHealth()` on every `Rack` it knows about. The `Map` that comes back is a "health factor" for each `Server` , from 0.0 if the server has turned into a very expensive doorstop, up to 1.0 if the server is shiny, new, and working perfectly. If any server has a health factor lower than 0.9, we want a technician to inspect it for imminent flaws. Any server with a health factor of less than 0.8 should be replaced... before it fails.

The `WingnutClient` provides the methods we need to get a technician to handle our server problems. They don't know anything about `Server`s, though, so we have to tell them what `Rack` the problem server is in, and which "unit" slot it's installed in. `Rack` has a `getUnitForServer()` method that tells us which unit slot any given `Server` is in.

If a `Server` needs to be replaced, we may be able to get a replacement under warranty! The `WarrantyClient` lets us look up any `Server`'s `Warranty` with its `getWarrantyForServer()` method.

Unfortunately, all these services run on servers, which might have problems of their own. If something goes wrong with Wingnut, our `WingnutClient` calls could return a `WingnutServiceException`. If we just passed in bad parameters, we'll get a `WingnutClientException`. If a `Server` doesn't have a `Warranty` -- which it *always* should -- we'll get a `WarrantyNotFoundException`. Even `Rack` checks its inputs, and throws `NoSuchServerException` if we try to get a `Server` from a `Rack` where it isn't installed. `RackMonitor` converts these to `RackMonitorException` if it's something it did wrong, and `RackMonitorDependencyException` if something went wrong with a dependency. Note that all these

exceptions are *checked* exceptions, so the compiler will complain if the code doesn't `catch` them or declare that the method `throws` them.