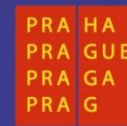




OPERAČNÍ PROGRAM PRAHA
ADAPTABILITA



EVROPSKÝ SOCIÁLNÍ FOND

Pogamut 3

Lekce 2 - Mapa

PRAHA & EU

INVESTUJEME DO VAŠÍ BUDOUCNOSTI

Faculty of mathematics and physics
Charles University at Prague
2nd March 2012



UT2004 & UE2 bots made easy!

Pogamut 3

Lecture 2 – Exploring the map



Today's menu

1. How to see & How to move

- Navigation graph
- NavPoints, NavPointNeighbourLink, Items

2. Events / Listeners / Annotations

- Bot startup sequence

3. World navigation

- Path planner, Path Executor

4. Navigation

- Floyd-Warshall Map, PathAutoFixer, TabooSet

How would you program AI?

The big question

Imagine you're a game developer and you're facing a challenge to design IVA / AI for nextgen FPS game (e.g. Halo 13, F.E.A.R. 8, Hitman 6, ...) what would you do?

Try to come up with as many ideas about IVA and AI for 3D worlds as possible!

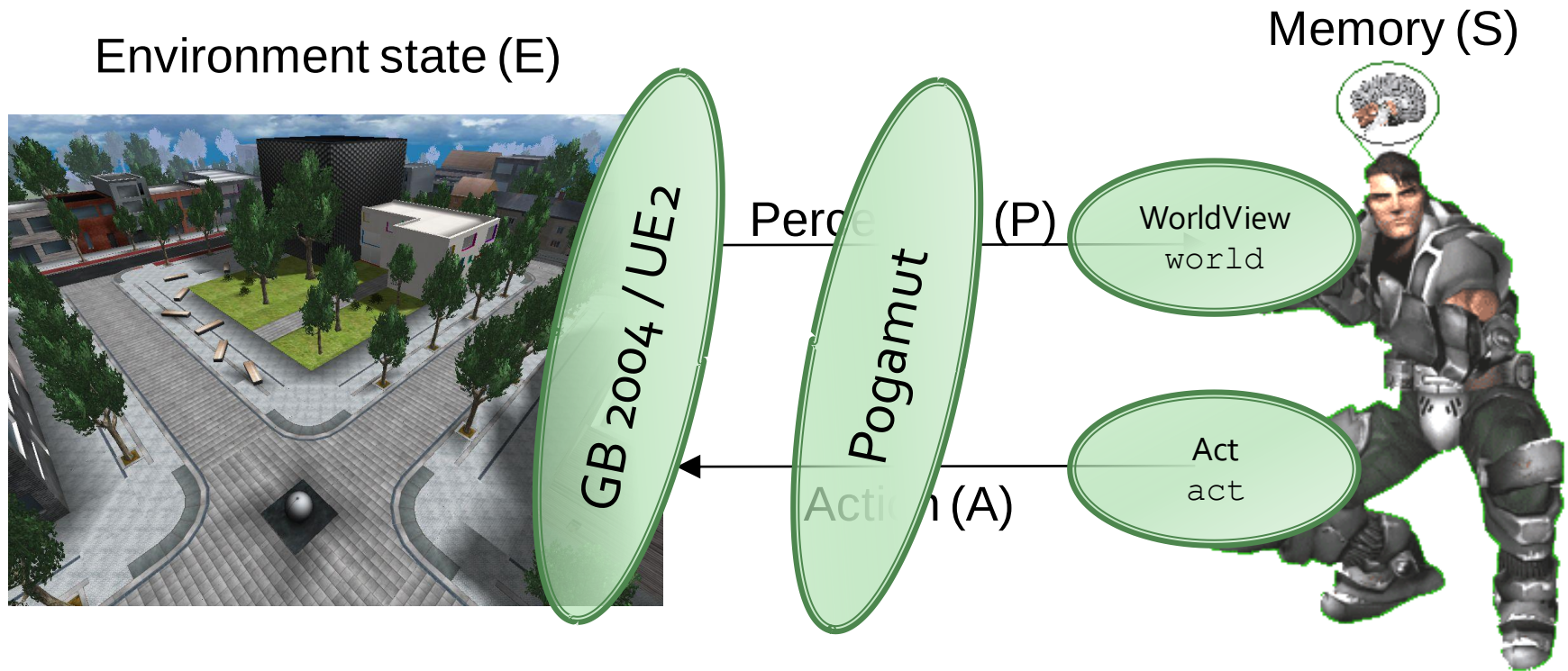
How would you program AI?

Some ubergeneral ideas

- Triggers / Events / Listeners
- Data gathering methods
- Action execution methods
- Preprocessed environment representation
- Classes for environment navigation
- IVAs synchronization
- Decision making encapsulation
 - FSM, goal-plan separation, planning

IVAs for UT2004 / UE2

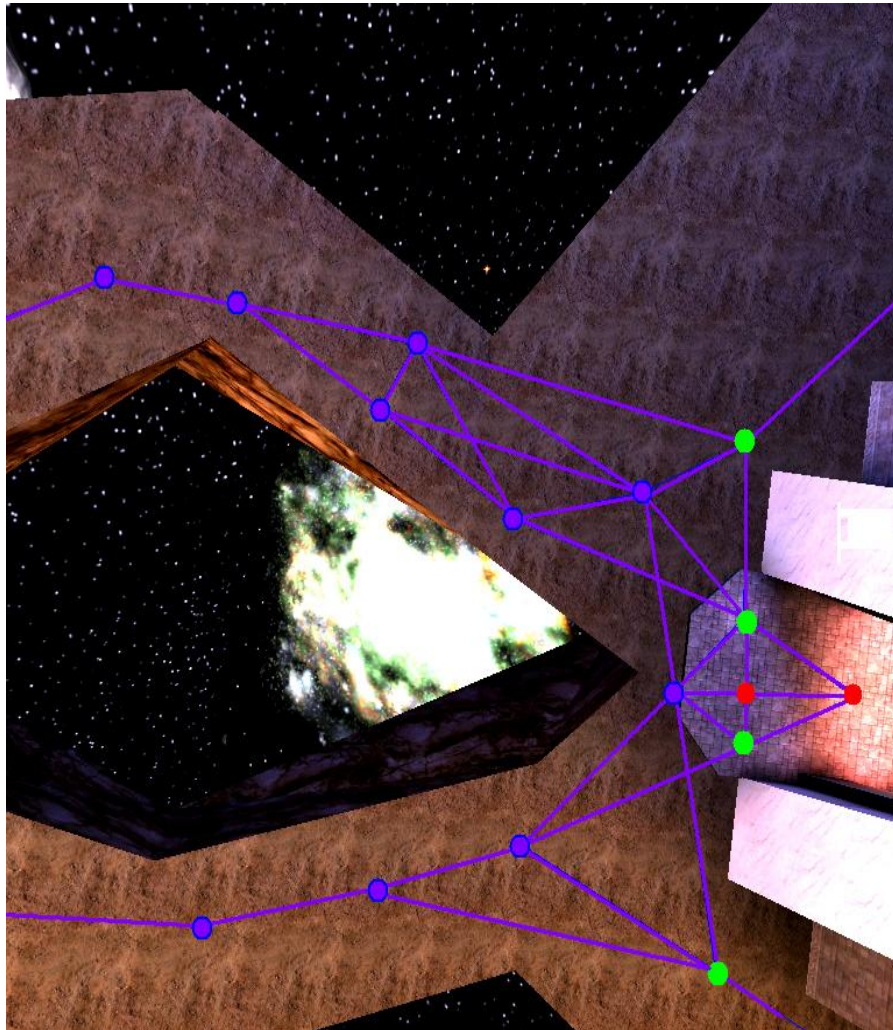
Recapitulation



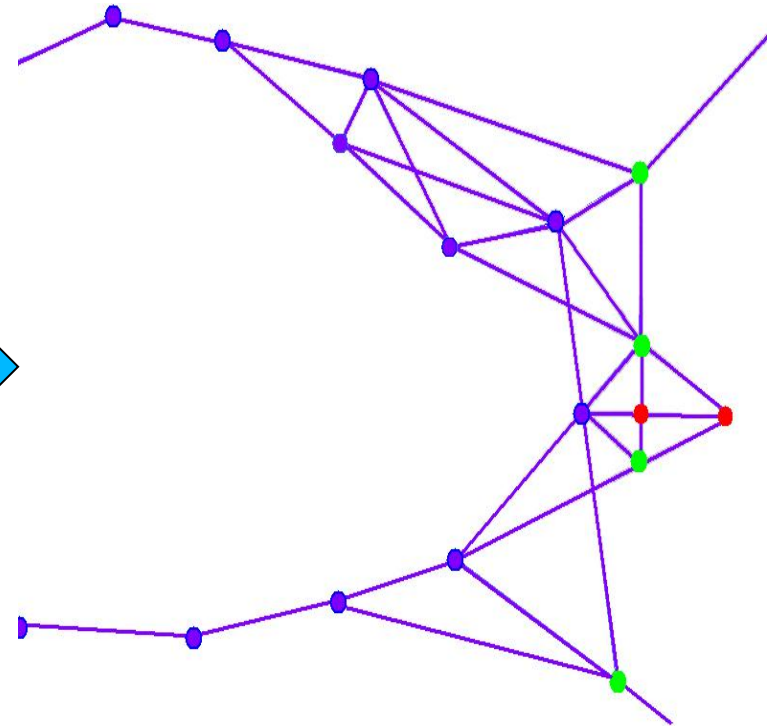
1. Part of environment state E is exported to the agent $p(E) = P$
2. Agent performs action-selection: $f(P, S) \rightarrow A \times S$
3. Actions are carried out in the environment: $a(A^n, E) \rightarrow E$

UT2004 World Abstraction

Navigation graph



#Navpoints in the map = 100 – cca 5000



UT2004 World Abstraction

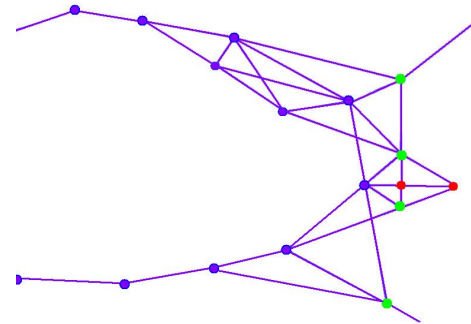
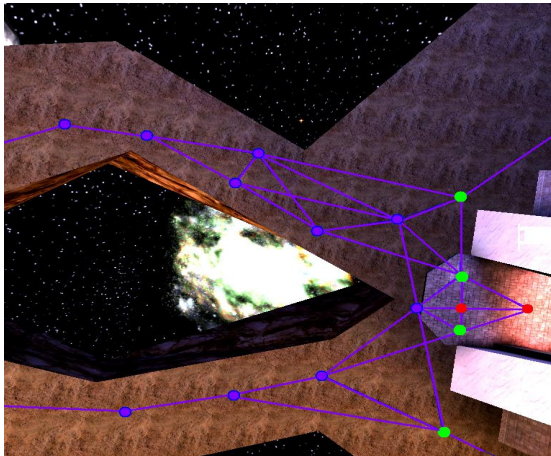
Underlying classes

Classes of interest:

NavPoint, NavPointNeighbourLink, Item
ILocated, Location, DistanceUtils
ItemType, ItemType.Category,
ItemDescriptor

Methods of interest:

```
this.items.getAllItems (ItemType)  
this.descriptors.getDescriptor (ItemType)  
this.world.getAll (NavPoint.class)  
this.world.getAll (Item.class)  
NavPoint.getOutgoingEdges ()  
NavPoint.getIncomingEdges ()
```



Today's menu

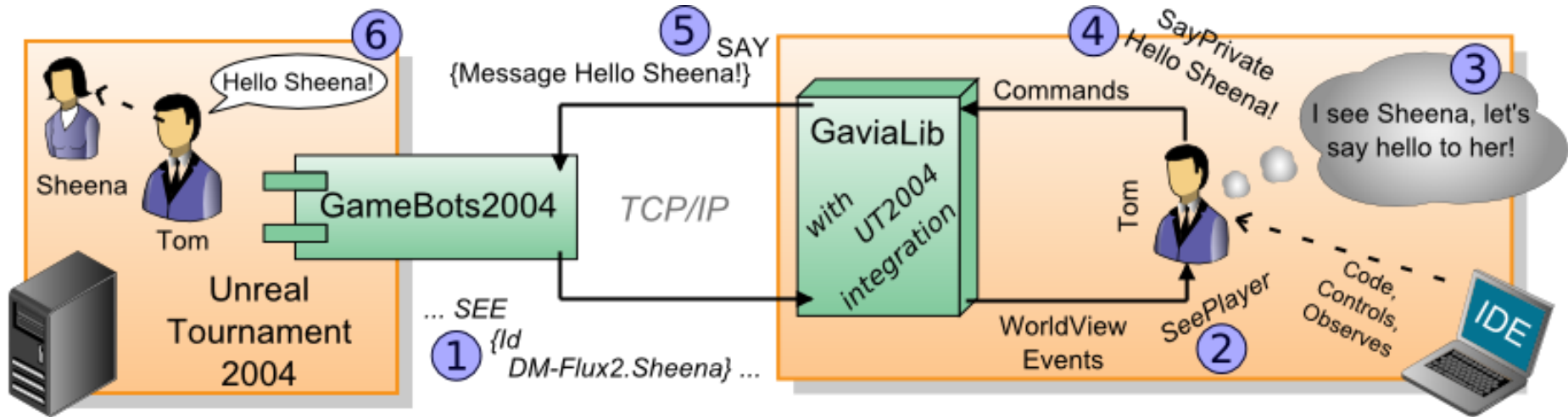
1. How to see & How to move
 - Navigation graph
 - NavPoints, NavPointNeighbourLink, Items
2. **Events / Listeners / Annotations**
 - **Bot startup sequence**
3. Path executor, Path planner
 - Path executor, Path planner
4. Navigation
 - Floyd-Warshall Map, PathAutoFixer, TabooSet

How to be informed?

Events, Update Events, Objects, Listeners

- `IWorldEvent <- IWorldObjectUpdatedEvent`
- `IWorldObject <- NavPoint, Player, Item, ...`
 - Every object has `getId()`
- You may hook up listeners to be informed about the events as they happen
- Events (not update events) are not otherwise accessible! Once you miss them, they are gone...

Events & Listeners



Classes of interest:

```
IWorldView <- IVisionWorldView  
IWorldEventListener  
IWorldObjectListener  
IWorldObjectEventListener  
AnnotationListenerRegistrator
```

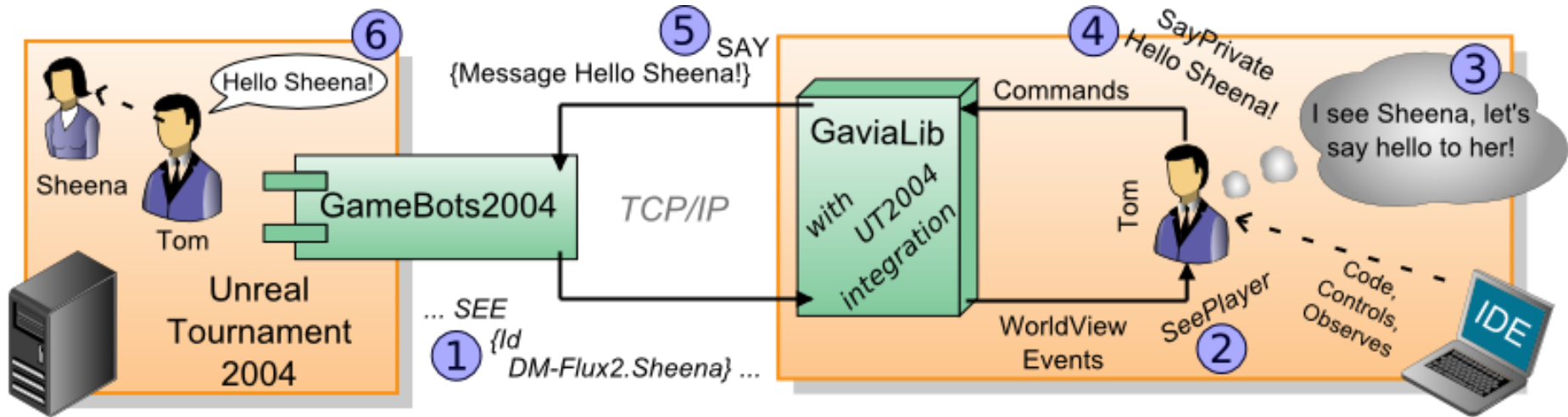
Methods of interest:

```
this.world.addEventListener(...)  
this.world.addObjectListener(...)
```

Method annotations:

```
@EventListener  
@ObjectClassEventListener
```

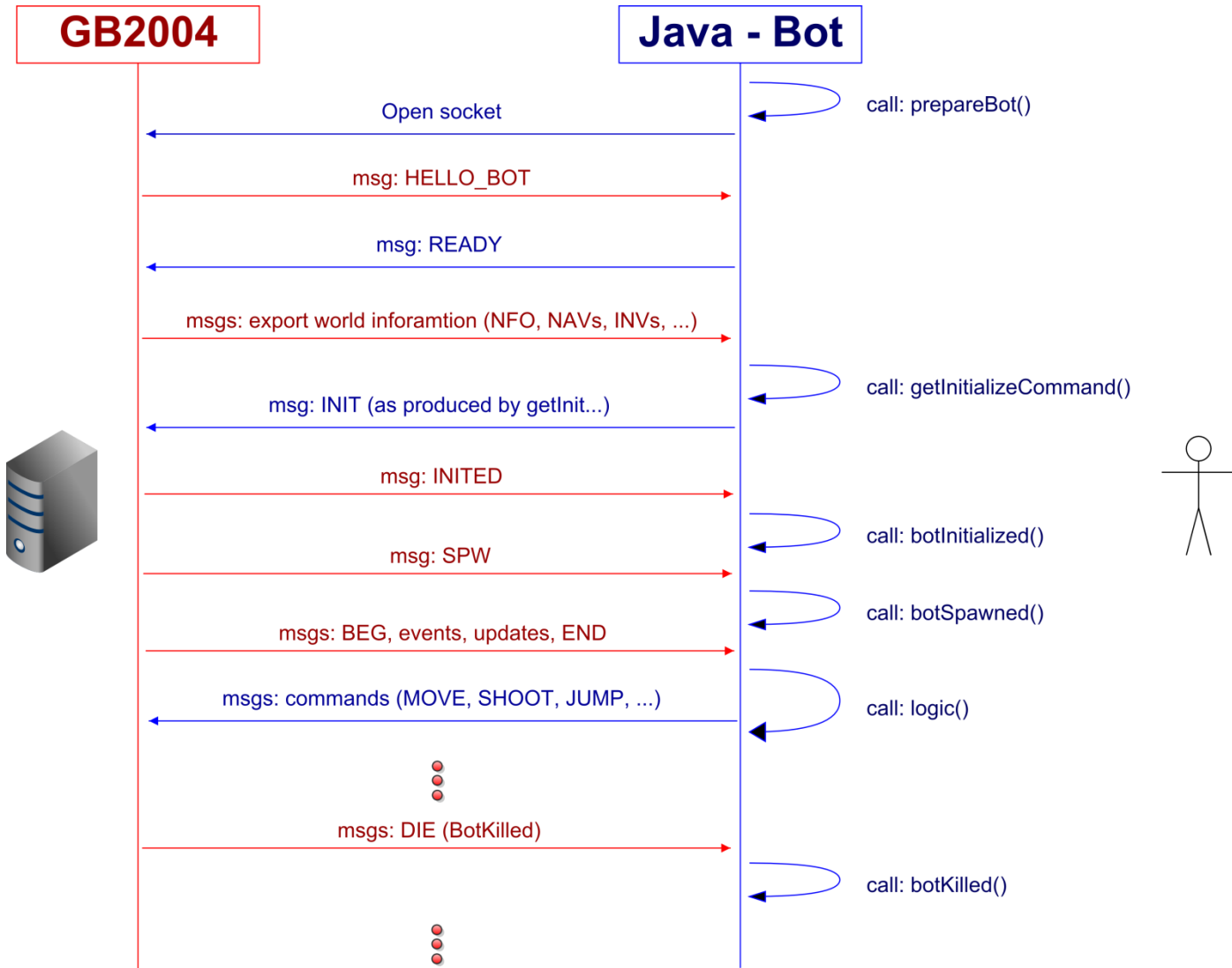
Events & Listeners



- http://diana.ms.mff.cuni.cz/pogamut_files/latest/doc/gamebots/ch06.html
- http://diana.ms.mff.cuni.cz/pogamut_files/latest/doc/javadoc/
 - Search for IWorldEvent and its descendants

Events & Listeners

Bot startup sequence



Events & Listeners

Let's check it out inside ResponsiveBot now!

```
<archetype>  
  <groupId>cz.cuni.amis.pogamut.ut2004.examples</groupId>  
  <artifactId>o1-responsive-bot-archetype</artifactId>  
  <version>3.2.5</version>  
  <repository>http://diana.ms.mff.cuni.cz:8081/artifactory/repo</repository>  
</archetype>
```

Assignment 3 (or HomeWork)

10 / 100 points

- Alter **ResponsiveBot** to create **RetaliatorBot**
 1. If player hits you, remember his ID and try to bite back.
 2. Whenever you deliver at least the same amount of damage to the offender, stop shooting.
- You must use listeners!
- What if multiple players hit you at once?
 - Solve this situation!

Assignment 3 (or HomeWork)

Cheat sheet

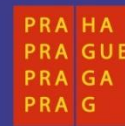
- PlayerDamaged event (use @EventListener)
- PlayerKilled event (use @EventListener)
- BotDamaged event (use @EventListener)
 - `botDamaged.getInstigator()`
 - Watch out for nulls!
- `shoot.shoot(Player)`
- `players.getPlayer(UnrealId)`
- `player.isVisible()`
- `move.turnHorizontal(degrees)`

Send your assignment to

- Completely zip-up your project(s) folder
- Send it to:
 - Jakub Gemrot (Friday practice lessons)
 - jakub.gemrot@gmail.com
 - Michal Bída (Tuesday practice lessons)
 - michal.bida@gmail.com
- Write us how much time you have spent on the assignment!



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