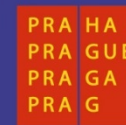




OPERAČNÍ PROGRAM PRAHA
ADAPTABILITA



EVROPSKÁ UNIE

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Pogamut 3

Lekce 7 – Předměty a zbraně

PRAHA & EU

INVESTUJEME DO VAŠÍ BUDOUCNOSTI

Faculty of Mathematics and Physics
Charles University in Prague
11th April 2013



UT2004 bots made easy!

Pogamut 3

Lecture 7 – Items and Weapons



Warm Up!



- Fill the short test for this lessons
 - 6 minutes limit
 - <http://alturl.com/u0q75>
 - https://docs.google.com/forms/d/1oBu4yPY46oebtuMv54yHFx7iQZqJHrpO4BJrHYC_pr4/viewform

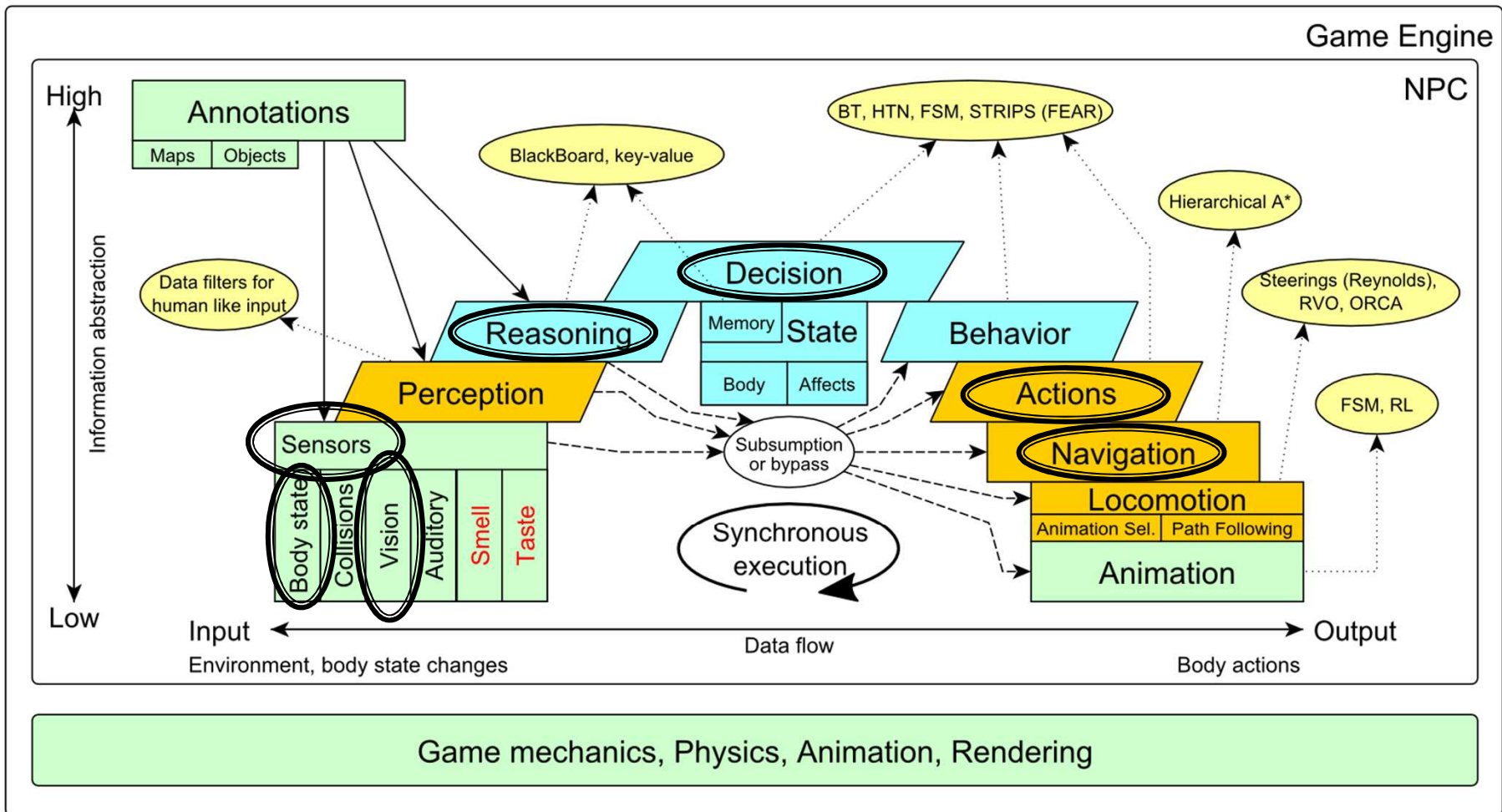
Today's menu



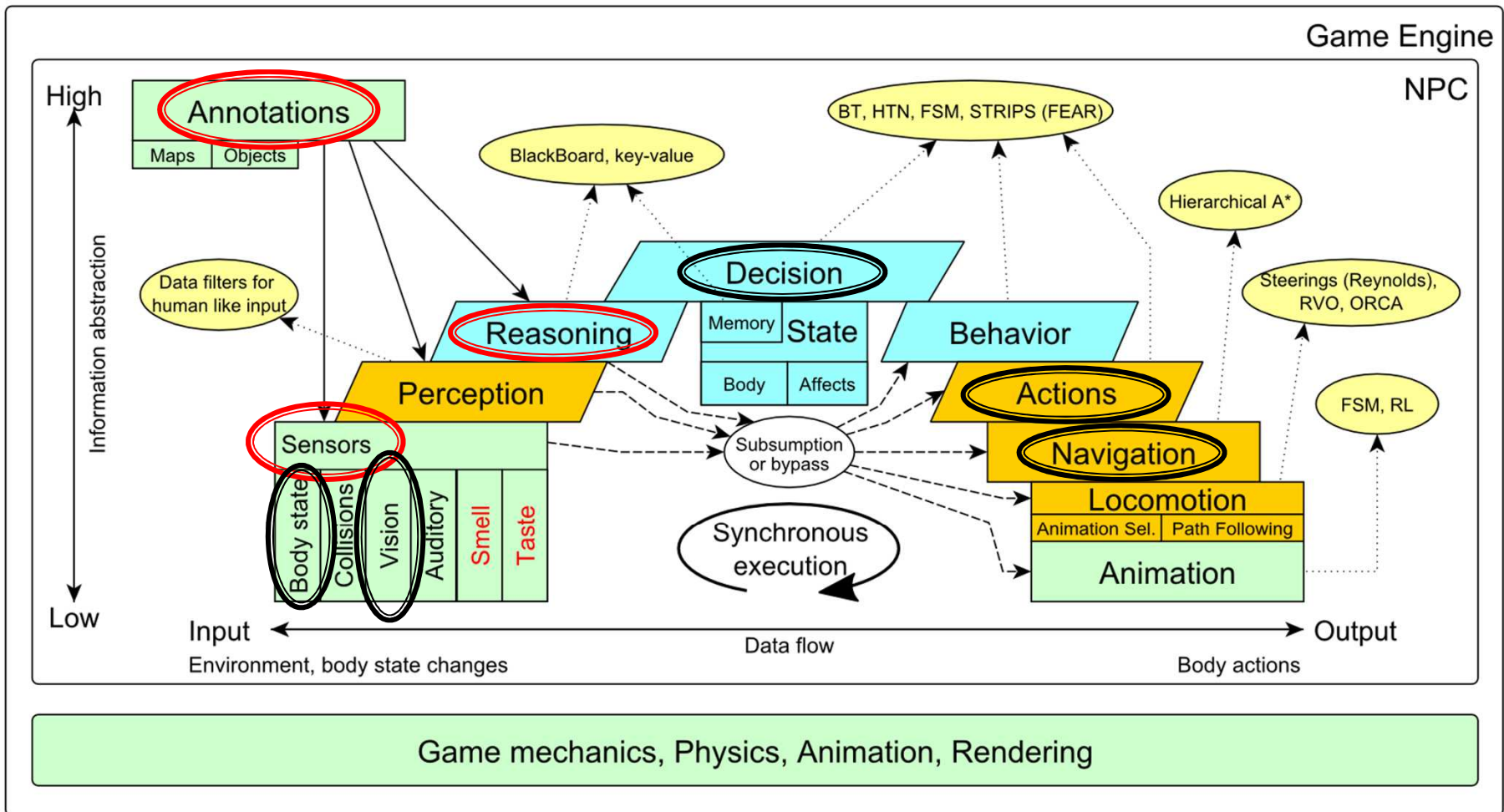
1. **Big Picture**
2. Pogamut World Abstraction
3. Navigation intermezzo
4. Items
5. Weapons introduction

Big Picture

Already covered



Big Picture Today



Today's menu



1. Big Picture
2. **Pogamut World Abstraction**
3. Navigation intermezzo
4. Items
5. Weapons & Shooting

Pogamut World Abstraction

Items overview



Objects (IWorldObject):

- Player
- **Item**
- NavPoint
- Self
- IncomingProjectile

- Use modules, listeners and Pogamut helper classes!
 - `this.players`, `this.items`, `this.info` ...
 - MyCollections, DistanceUtils, fwMap

Events (IWorldEvent):

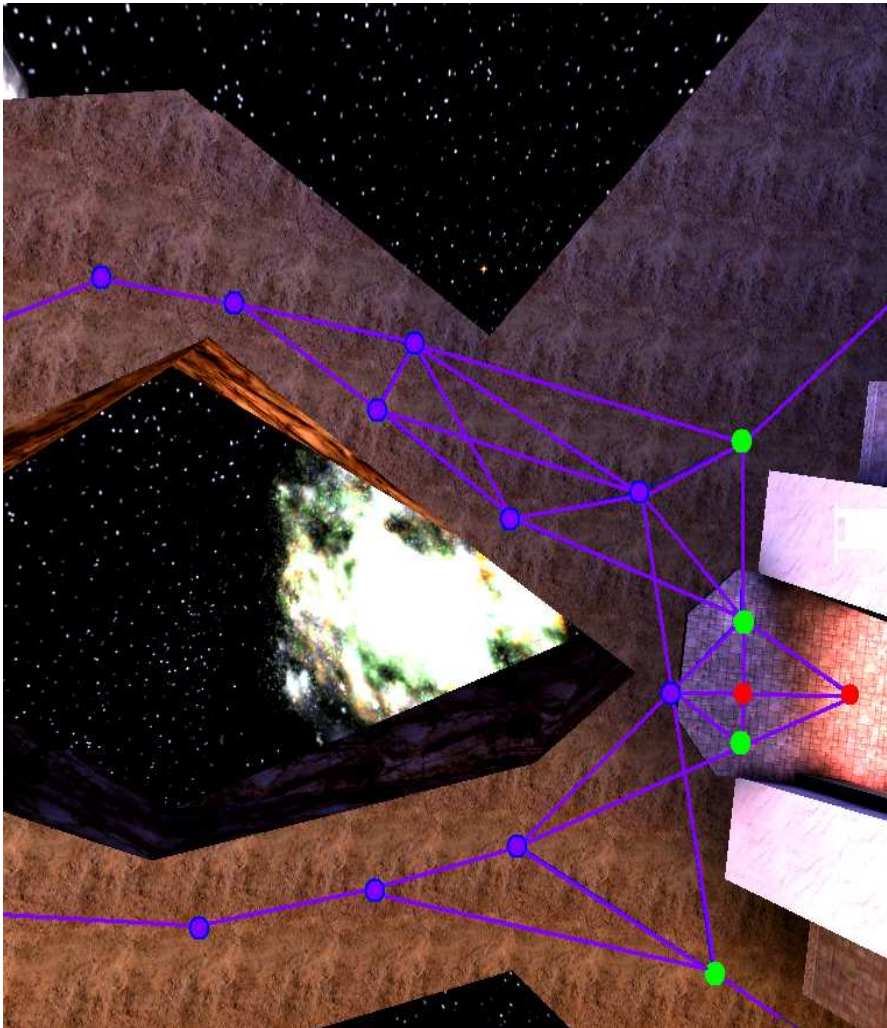
- HearNoise & HearPickup
- BotDamaged & BotKilled
- PlayerDamaged & PlayerKilled,
- **ItemPickedUp**
- GlobalChat

```
if (this.items.getSpawnedItems().values().size() > 0) { ... }
```

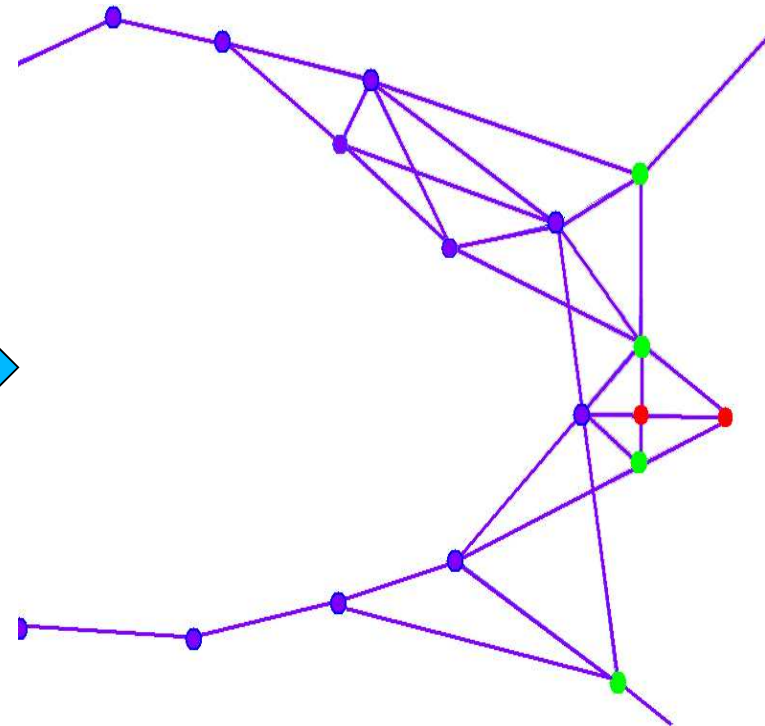
```
@EventListener(eventClass = ItemPickedUp.class)
public void itemPickedUp(ItemPickedUp event) {
    ...
}
```


UT2004 World Abstraction

Navigation graph



#Navpoints in the map = 100 – 5000



UT2004 World Abstraction

Nav link/NavPoint types



■ NavPoints

- InventorySpot
- JumpPad
- Lift
- Teleport
- Door
- PlayerStart
- SnipingSpot
- ...

■ Nav links

- Walk
- Jump
- Lift
- Door
- DoubleJump
- ...

Today's menu



1. Big Picture
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3. **Navigation intermezzo**
4. Items
5. Weapons introduction

Navigation

Step by step



General steps:

1. Decide where to go
2. Plan the path (list of navpoints)
3. Follow the path

Navigation

Step by step



Improvements:

1. Decide where to go
2. Plan the path (list of navpoints)
3. Follow the path
 - Watch for meaningfulness!
4. Check that you have truly grabbed the item!

Navigation

Stages



1. Decide where to go (Decision making!)
 - `items.getSpawnedItems(ItemType)`
 - perform reasoning
 - It's OK to compute paths to all spawned items every `logic()`
2. Plan and follow the path
 - `this.navigation.navigate(item)`

Navigation

Stages



3. Follow the path

- Do you still believe that item your running for is spawned?

- It might have been picked up by your opponent!

```
if (!items.isPickupSpawned(item))  
{ replan(); }
```

Navigation

Stages



4. Check that you truly grabbed the item!
 - UT2004 navigation is not 100% precise
 - It might stopped running just right before the item!

```
@EventListener(eventClass = ItemPickedUp.class)
public void itemPickedUp(ItemPickedUp event) {
    if (itemRunning.getId().equals(event.getId())) {
        // I have picked the item!
    }
}
```


Today's menu



1. Big Picture
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Items

Basics



- Item (accessible via `this.items` !)
 - More “spawning location” than item
 - `items.isPickupSpawned(item)`
 - Unique `UnrealId` => Can be used in Set, Map
 - `ILocated` ~ `getLocation()` ~ X, Y, Z
 - `IViewable` ~ `isVisible()`
 - Always has corresponding `NavPoint` instance
 - `NavPoint itemNP = item.getNavPoint()`
 - Described by `ItemType`
 - `item.getType()`

Items

Important ItemType



```
ItemType . FLAK_CANNON  
         . MINIGUN  
         . LIGHTING_GUN  
         . ROCKET_LAUNCHER  
         . LINK_GUN
```

```
ItemType . SUPER_HEALTH  
         . SUPER_ARMOR  
         . SHIELD_PACK  
         . SUPER_SHIELD_PACK  
         . U_DAMAGE_PACK
```

Items

ItemType & Categories



- `ItemType`
 - Enum holding concrete type of the item
 - Part of some `ItemType.Category`
 - Categories are divided based on what items are intended to do
 - `ItemType.Category.HEALTH`
 - `ItemType.Category.ARMOR`
 - `ItemType.Category.SHIELD`
 - `ItemType.Category.WEAPON`
 - `ItemType.Category.AMMO`

Items

Items



- Agent module: `items`

```
items.getAllItems()
```

```
items.getVisibleItems(ItemType)
```

```
items.getSpawnedItems(ItemType)
```

```
items.isPickable(Item)
```

- `DistanceUtils`

```
.getNearest(Collection<Ilocated>)
```

```
.getNthNearest(n, Collection<Ilocated>)
```

- `fwMap`

```
.getNearestItem(Collection<Item>)
```

Items

ItemDescriptor(s)



- Every item is “well” described

```
Item item =
    items.getAll(ItemType.Category.WEAPONS).values()
        .iterator().next();
WeaponDescriptor weaponDesc =
    (WeaponDescriptor)
    descriptors.getDescriptor(item.getType());
if (weaponDesc.getPriDamage() > 50) {
...
}
```

- Ammo / Armor / HealthDescriptor available as well

Today's menu



1. Big Picture
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5. **Weapons introduction**
 - <http://planetunreal.gamespy.com/View.php?view=UT2004GameInfo.Detail&id=26>

Weapons

UT2004 weapons guide I – the weak



- **ItemType.SHIELD_GUN** (DEFAULT)
 - Melee weapon (can be charged)
 - Secondary mode – shield
- **ItemType.ASSAULT_RIFLE** (DEFAULT)
 - Weak, basic, inaccurate (can have two)
 - Secondary mode – grenades (charged)
- **ItemType.BIO_RIFLE**
 - Fires green blobs, short range, defense weapon
 - Secondary mode – charged (big blob)
- **ItemType.LINK_GUN**
 - Primary fires rather slow, but decent projectiles
 - Secondary – medium-to-short range beam



Weapons

UT2004 weapons guide II – the strong



- **ItemType.FLAK_CANNON**

- Shotgun style weapon – deadly at short range
- Sec. mode is a grenade launcher



- **ItemType.MINIGUN**

- Choose between rapid fire but less accuracy (pri. mode) or slower fire and more accuracy (sec. mode)



- **ItemType.SHOCK_RIFLE**

- Pri. mode is very accurate with medium damage
- Sec. mode fires slow moving projectiles, that can be detonated by pri. fire making a big explosion (tricky to do though)



- **ItemType.LIGHTING_GUN, SNIPER_RIFLE**

- Sniper rifle – precise, can one-shot others by a headshot
- Bots can use only pri. fire (sec. is zoom)



Weapons

UT2004 weapons guide III – mayhem



- **ItemType** . **ROCKET_LAUNCHER**

- Good old rocket launcher, rockets have splash damage (beware!)
- Secondary mode can charge up to three rockets



- **ItemType** . **REDEEMER**

- Unleash nuclear mayhem!
 - big splash damage radius
- Bots can use only primary firing mode!



- **ItemType** . **U_DAMAGE_PACK**

- Not enough damage? Grab DOUBLE DAMAGE pack and double your damage output!



Weapons

Weaponry class



- `this.weaponry`
 - All you wanted to know about UT2004 weapons but were afraid to ask
 - Note that it contains also some obsolete and to-be-deprecated methods...

```
weaponry.getCurrentWeapon()  
weaponry.hasWeapon( ItemType )  
weaponry.hasLoadedWeapon()  
weaponry.hasPrimaryLoadedWeapon()  
weaponry.hasSecondaryLoadedWeapon()  
weaponry.getLoadedWeapons()  
weaponry.changeWeapon()  
...
```

Assignment 7

(or Homework)



- Create **CollectorBot**
 - Collects weapons, ammo and armor on the map
 - Run 3 bots on DM-10n1-Albatross
 - What if the item you want to pick up is not there? (e.g. you run two collector bots and the other one got it first) ~ **items.isPickupSpawned(item)**
 - Re-plan!
 - How to check that your bot can pick some item?
 - `items.isPickable(Item)`
 - How to check the bot successfully picked up an item?
 - How to avoid unreachable items?
 - Use TabooSet

Assignment

Cheatsheet



- Getting and filtering the items:
 - `this.items.getSpawnedItems(ItemType.Category.WEAPON)`
 - `MyCollections.getFiltered(Collection, new IFilter<Item>() { ... })`
- Handling unreachable items:
 - `Navigation.addStrongNavigationListener(...STUCK_EVENT...)`
 - `myTabooSet.add() & myTabooSet.filter(...)`
- Some thin items (e.g. HealthVial) are tricky to pick up!
How to be sure that your bot has picked the item up?
 - `ItemPickedUp.class` event
`@EventListener(eventClass=ItemPickedUp.class)`
`public void pickedUp(ItemPickedUp event) { }`

Questions?

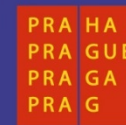
I sense a soul in search of answers...



- We do not own the patent of perfection (yet...)
- In case of doubts about the assignment, tournament or hard problems, bugs don't hesitate to contact us!
 - Jakub Gemrot (Monday practice lessons)
 - jakub.gemrot@gmail.com
 - Michal Bída (Thursday practice lessons)
 - michal.bida@gmail.com



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