



OPERAČNÍ PROGRAM PRAHA
ADAPTABILITA



EVROPSKÝ SOCIÁLNÍ FOND

Pogamut 3

Lekce 7 – Debugging

PRAHA & EU
INVESTUJEME DO VAŠÍ BUDOUCNOSTI

Faculty of mathematics and physics
Charles University at Prague
6th April 2012



UT2004 & UE2 bots made easy!

Pogamut 3

Lecture 7 – Debugging, UE2



```
Output - 00-emohawk-empty-bot  Search Results
More info on One-Jar: http://one-jar.sourceforge.net/
License for One-Jar: http://one-jar.sourceforge.net/one-jar-license.txt
One-Jar file: C:\Users\knight\Documents\NetBeansProjects\EmohawkEmptyBot\tar

[install:install]
Installing C:\Users\knight\Documents\NetBeansProjects\EmohawkEmptyBot\target
Installing C:\Users\knight\Documents\NetBeansProjects\EmohawkEmptyBot\pom.xml
Installing C:\Users\knight\Documents\NetBeansProjects\EmohawkEmptyBot\target
Installing C:\Users\knight\Documents\NetBeansProjects\EmohawkEmptyBot\target\EmohawkEmptyBot-1.0-SNAPSHOT-test-sources.jar to C:\Users\knight\.m2\repository\com\mycompany\Emol
Installing C:\Users\knight\Documents\NetBeansProjects\EmohawkEmptyBot\target\EmohawkEmptyBot-1.0-SNAPSHOT-tests.jar to C:\Users\knight\.m2\repository\com\mycompany\EmohawkExp
Installing C:\Users\knight\Documents\NetBeansProjects\EmohawkEmptyBot\target\EmohawkEmptyBot-1.0-SNAPSHOT-one-jar.jar to C:\Users\knight\.m2\repository\com\mycompany\EmohawkE

-----
BUILD SUCCESS
-----
Total time: 9.317s
Finished at: Thu Apr 05 17:52:49 CEST 2012
Final Memory: 11M/495M
```

Warm up!

Fill the test for this lecture!
(you can get up to 5 bonus points!)

Home work: CTF Bot

Let's review home works from previous lectures!

Remember – How to handle weapons:

```
weaponPrefs
```

```
shoot.shoot(weaponPrefs, enemy)
```

See HunterBot Pogamut archetype.

Today's menu

1. **Debugging**
 - **How to debug your bots effectively**
2. **Pogamut on UnrealEngine2Runtime**
 - **Bot Types, Animations, Emoticons, Steerings**

Debugging

- Perhaps all of you realized by now that you spend most of the time by revising the code and/or debugging when coding a bot.
- This is important and today we will show you what NetBeans and Pogamut offers to do it more effectively.

Debugging - UT2004/UE2

- CTRL/ALT + H – enables/disables GB HUD help
- CTRL/ALT + D – displays last Pogamut command
- CTRL/ALT + G – displays navigation links
- CTRL/ALT + P – displays approximate FOV and bot focus (has three stages – off, bot position, bot position and FOV and focus information)
- CTRL/ALT + U – displays text bubble above bot head (text messages the bot sends – `body.getCommunication()....` will be displayed there)
- CTRL/ALT + B – displays bot health/armor/adrenaline bar

- CTRL/ALT + R – displays bot route (we need to set it in bot code)

(CTRL works in UnrealEngine2Runtime, ALT works in UT2004)

Debugging – NetBeans I

- How to read Pogamut exceptions?
 - Each time there is an exception in your bot following things happen:
 1. Exception is printed in NetBeans output log window.
 2. Bot shutdown sequence is initiated.
 3. All Pogamut modules are killed and this is notified in the output log.
- ➔ When exception occurs, **search for the first (== top-most) exception** in the NetBeans output log window!

Debugging – NetBeans II

- Pogamut logs a lot of things in the output, usually it is a good idea to set Pogamut log level to WARNING, so the log won't be spammed by unnecessary information.
 - In main method set:

```
UT2004BotRunner (YourBot.class, "TheBot")  
    .setMain(true)  
    .setLogLevel (Level.WARNING)  
    .startAgent();
```
- Use the log to log what your bot is doing!
 - Then use either of following:

```
log.info("Bot running to FLAG");  
log.warning("Bot captured the FLAG");  
System.out.println("BAD !!!");
```

Debugging – NetBeans III

- Use bot text messages (have them activated in Unreal by CTRL/ALT + U)!

```
body.getCommunication()  
    .sendGlobalBubbleMessage("Message", 5);
```

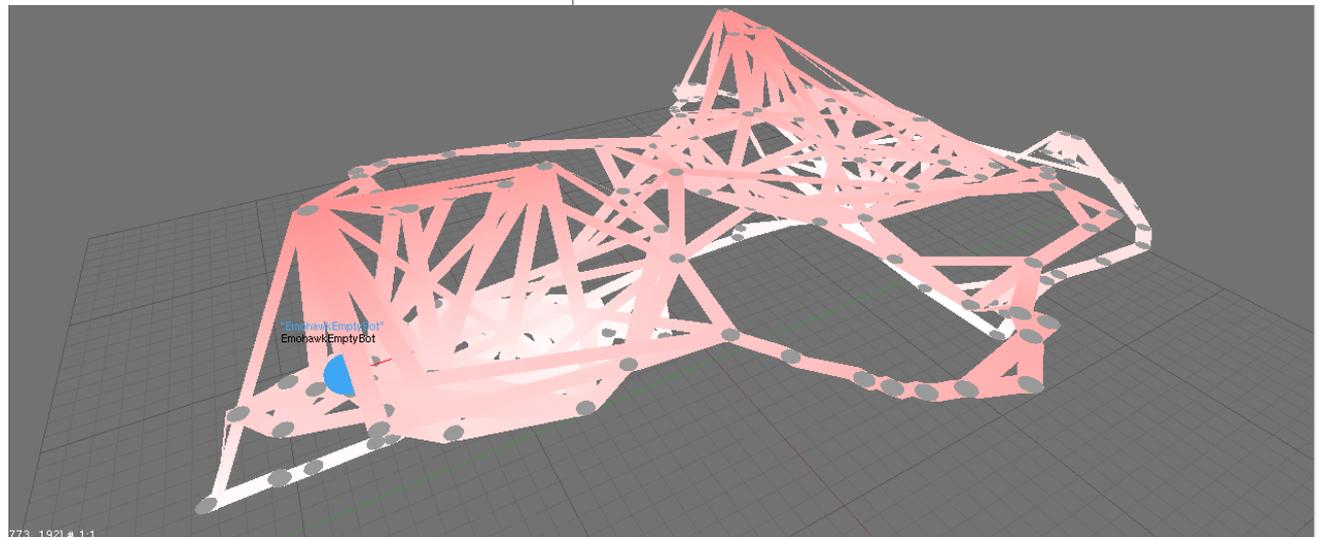
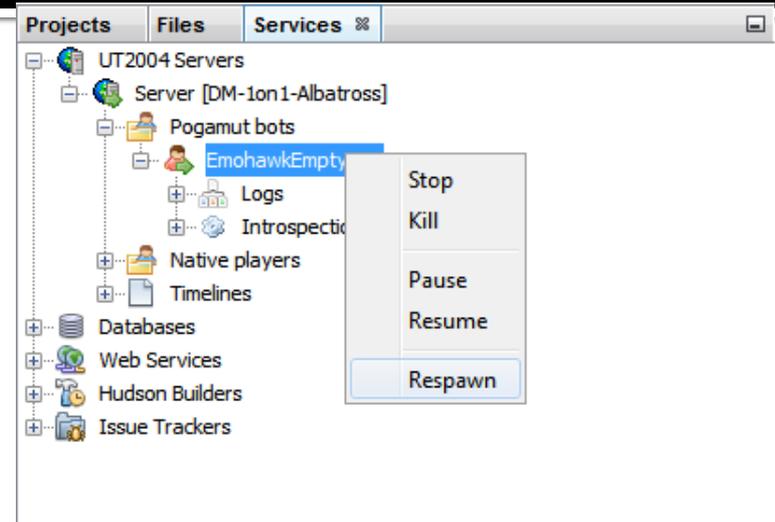
- You can also change the bot name (don't use special characters)!

```
config.setName("Bot SHOOTING");
```

- And remember: you can use NetBeans debug mode with breakpoints.
 - When bot pauses at a breakpoint, environment won't be paused, however you can still revise the actual (frozen) state of bot variables and step-by-step see where the execution goes.

Debugging – Pogamut Plugin

- Don't forget about Pogamut NetBeans plugin!
- Double click on Server to open map visualization in NetBeans!



Debugging – Introspection

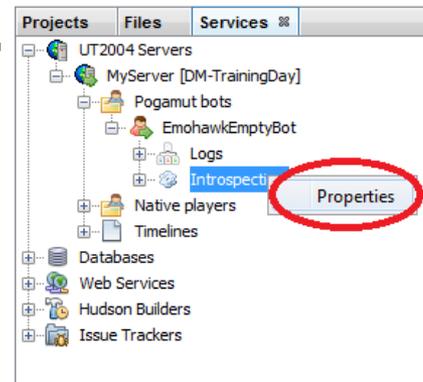
- Change bot variables at runtime with Pogamut introspection.
1. Annotate vars you want to change byt `@JProp` annotation.
 2. Go to Services, UT2004 Servers, find your bot, right click Introspection and click on Properites.
 3. Window where you can change bot annotated variables appears.
-
- All standard Java types supported.
 - Useful when tweaking bot params.
 - I.e. params for assessing bot low-health, having-enough-weapons, etc...

1

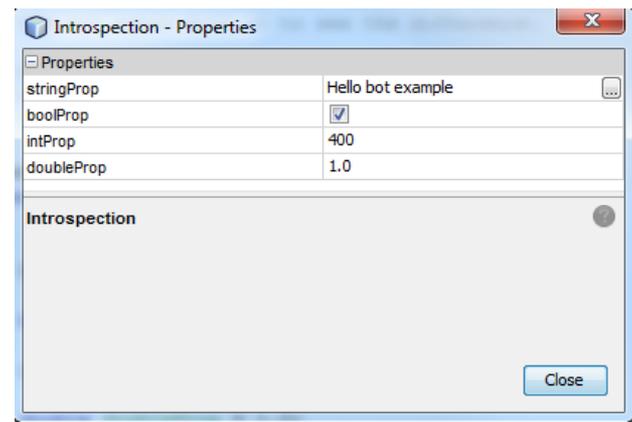
```
@AgentScoped
public class EmohawkEmptyBot extends EmohawkBotController {

    @JProp
    public String stringProp = "Hello bot example";
    @JProp
    public boolean boolProp = true;
    @JProp
    public int intProp = 2;
    @JProp
    public double doubleProp = 1.0;
}
```

2



3



Debugging/coding – general

- When coding the bot, try to do it in steps.
- Each time implement simple chunk of behavior and test if it works.
- If you try to specify the whole behavior at once, you will usually find yourself lost in the code.
 - It is a **VERY GOOD** idea to specify the high-level plan at once with empty senses/methods.
 - Then implement senses and methods **one-by-one**, i.e., implement the behavior step by step.

Today's menu

1. Debugging
 - How to debug your bots effectively
2. **Pogamut on UnrealEngine2Runtime**
 - **Bot Types, Animations, Emoticons, Steerings**

Pogamut Bot on UE2 I

- Download the project EmohawkEmptyBot:
 - http://pogamut.cuni.cz/pogamut_files/lectures/2011-2012/Lecture07-EmohawkEmptyBot.zip
- Before you launch the bot, you need to start UnrealEngine2Runtime server:
 - Go to directory UnrealEngine2RuntimeDemo/System/ and launch `startEmohawkServer.bat` there.
 - To observe the bot in the environment launch `startUE2Runtime.bat` (after the server is launched).

Pogamut Bot on UE2 II

■ Bot Types

- There are more bot types (concerning the appearance and animation sets) in UE2.
- We can switch our bot type in `getInitializeCommand()` by setting

```
new Initialize()  
    .setClassName(  
        CharacterType.EMOHAWK.getUE2Class()  
    )
```

■ Animations

- Each bot has his set of animations.

■ Emoticons

- All bot types share the same set of emoticons.

■ Steerings

- Bots can use steerings.

UE2 – Bot Types

- In Pogamut Emohawk package, following bots are available:

- UDN_MALE - default one

```
new Initialize()  
    .setClassName(CharacterType.UDN_MALE.getUE2Class());
```

- UDN_FEMALE

```
new Initialize()  
    .setClassName(CharacterType.UDN_FEMALE.getUE2Class());
```

- EMOHAWK

```
new Initialize()  
    .setClassName(CharacterType.EMOHAWK.getUE2Class());
```

- THOMAS

```
new Initialize()  
    .setClassName(CharacterType.THOMAS.getUE2Class());
```

- BARBARA

```
new Initialize()  
    .setClassName(CharacterType.BARBARA.getUE2Class());
```

- NATALY

```
new Initialize()  
    .setClassName(CharacterType.NATALY.getUE2Class());
```

UE2 – Animations I

- Access all animations through `animations` module!
- All animations stored in `AnimType` enum.
- Bots have different sets of animations!
 - UDN bots have only animations prefixed by `UDN_`
 - EMOHAWK has only animations prefixed by `EMOHAWK_`
 - THOMAS, BARBARA and NATALY have all animations except `UDN_`, `EMOHAWK_` and animations prefixed by `EXT_` (external)
- The biggest set of anims for Tom, Barbara and Nataly is divided to groups by the prefix (`WALK_` for walking anims, `SOCIAL` for social, etc.)

UE2 – Animations II

- Play animations with `playAnim`, e.g.:
`animations.playAnim(AnimType.WALK_LOOP, true);`
- When you know you want to play the same animation in a loop, always set looping to `true` in `playAnim()` method!
- Don't spam animations playing, UnrealEngine doesn't like that (animation may not be played).

- Usually it is a good idea to do this:

```
if (animations.getCurrentPlayedAnimation() !=  
    AnimType.WALK_LOOP) {  
    animations.playAnim(AnimType.WALK_LOOP, true);  
}
```

UE2 – Emoticons

- Access emoticons by emoticons module.
- Set emoticons, single, double or triple:

```
emoticons.setEmoticon(  
    new Emoticon(  
        EmoticonType.AWFUL_224,  
        EmoticonBubbleType.BUBBLE_THOUGHT_CENTER  
    ),  
    5  
);
```

```
emoticons.setEmoticon(  
    new Emoticon(  
        EmoticonType.AWFUL_224,  
        EmoticonType.AWFUL_224,    EmoticonBubbleType.BUBBLE_THOUGHT_CENTER  
    ),  
    5  
);
```

```
emoticons.setEmoticon(  
    new Emoticon(  
        EmoticonType.AWFUL_224,  
        EmoticonType.AWFUL_224,  
        EmoticonType.AWFUL_224,  
        EmoticonBubbleType.BUBBLE_THOUGHT_CENTER  
    ),  
    5  
);
```

UE2 – Steering

- Don't forget about steerings – you can use them to navigate the bot in the environment.
- Access them by `steering` module.

```
steering.startNavigation();  
steering.addTargetApproachingSteering(  
    new TargetApproachingProperties(  
        SteeringProperties.BehaviorType.BASIC  
    )  
);  
steering.getTargetApproachingProperties()  
    .setTargetLocation(0, new Location(x,y,z));
```

Assignment 7

10 / 100 points

- Implement two bots communicating with each other with emoticons.
 - When the bot sees another bot/player he will approach him and say hi (through emoticon).
 - The bot reacts to emoticons of other bots by his own emoticons.
 - Use UnrealEngine2Runtime, in UT2004 there are no emoticons!

Assignment 7

Cheat sheet

```
//set bot emoticon
emoticons.setEmoticon(new
    Emoticon(EmoticonType.HI_213,
    EmoticonBubbleType.BUBBLE_THOUGHT_CENTER), 5);
//set bot init location so you don't have to search
new Initialize().setName("Bot").setLocation(new
    Location(6513,1570,-3440)); //near the sphere
//get other players emoticons
emoticons.getPlayerEmoticonInfo(UnrealId);
emoticons.getPlayerEmoticon(Player);
//play animations
animations.playAnim(AnimType.WALK_LOOP, true);

//DON'T USE this, there is a bug! Use remove instead
steering.clearAllSteerings();
//NewEmoticonEvent does not work!
```

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 (Wednesday practice lessons)
 - michal.bida@gmail.com
- Write us how much time you have spent on setting up the Pogamut platform and the assignment respectively!



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