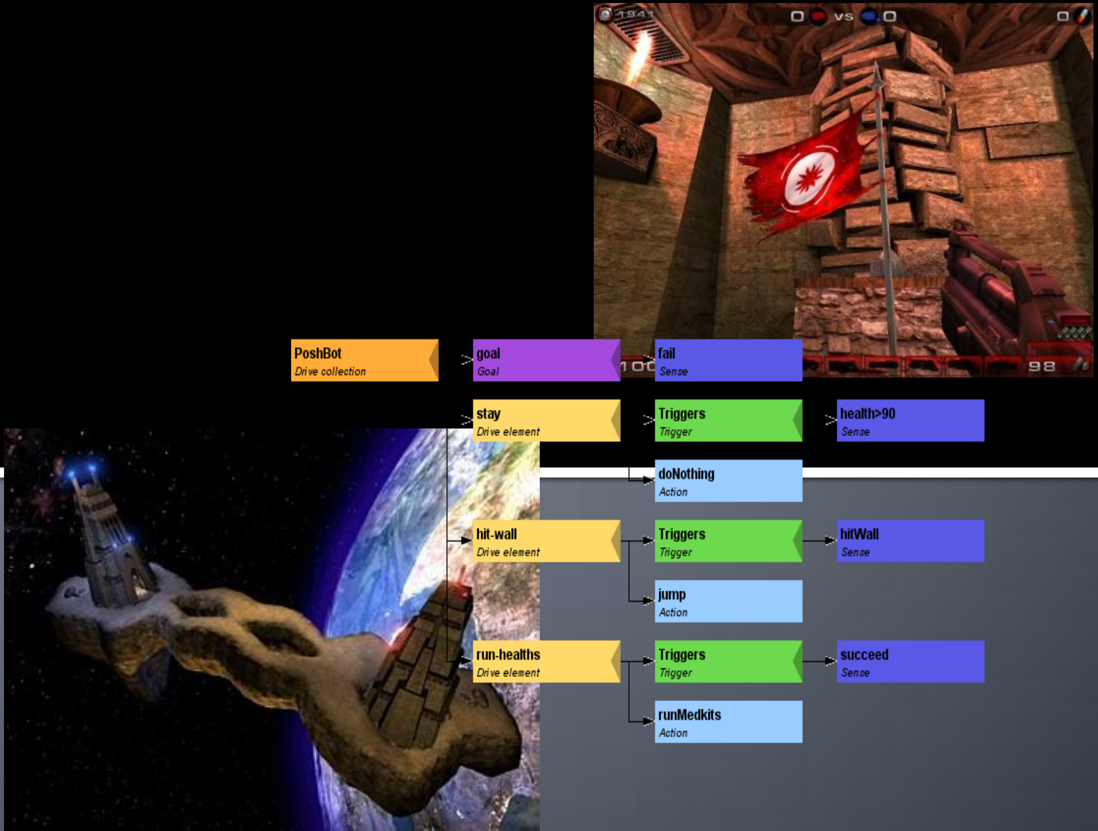
Faculty of Mathematics and Physics
Charles University in Prague
5nd May 2014

UT2004 bots made easy!

Pogamut 3

Lecture 09 – CTF



Warm Up!

- Fill the short test for this lessons
  - 6 minutes limit
  - http://alturl.com/p5su7
  - https://docs.google.com/forms/d/1kgyKJXq2x-yyx2GpLmTk_pgOAMpSipBXTVjbXFuo8as/viewform

Today’s menu

1. **Tips**
   - Navigation
   - yaPOSH
2. Capture the Flag (CTF)

Tips

Useful classes

- **MyCollections**

```
Item targetItem = MyCollections.getRandomFiltered(
    items.getSpawnedItems(UT2004ItemType.Category.
    WEAPON), myIFilter
);
```

- **fwMap**

```
fwMap.getNearestFilteredItem(…)
```

- **DistanceUtils**
- **Heatup**
- **Cooldown**

Tips
Anti-stuck I

- **Always handle STUCK event!**
  - Use TabooSets to temporarily filter items/navpoints you were stuck going to
    - This prevents your bot to cycle in 1) pick the same item, 2) run towards it, 3) stuck

```
TabooSet<Item> tabooItems = new TabooSet<Item>(bot);
this.navigation.addStrongNavigationListener(

   new FlagListener<NavigationState>() {
      @Override
      public void flagChanged(NavigationState changedValue){
             switch (changedValue) {
                       case STUCK:
                       case PATH_COMPUTATION_FAILED:
                               tabooItems.add(targetItem, 30);
                       break;
             }
      }
   }
);
```

Tips

Anti-stuck II

- Then don’t forget to use your taboo set to filter the items you are picking from!

```
if (!this.navigation.isNavigating()) {
    targetItem = MyCollections.getRandom(
      tabooItems.filter(items.getSpawnedItems().values())
    );
    this.navigation.navigate(targetItem);
}
```

Tips

aStar – plugging the path to navigation

1. Get starting point

```
NavPoint from =
  navigation.getNearestNavPoint(
        info.getLocation()
  );
```

2. Get target point

```
NavPoint to =
  MyCollections.getRandom(
        navPoints.getNavPoints().values()
  );
```

3. Find the path

```
IPathFuture pf =
  aStar.computePath(from, to);
```

4. Execute it

```
this.navigation.navigate(pf);
```

Tips

yaPOSH – setting up stuff

- In yaPOSH, a good place to register navigation state listeners, TabooSets and weapon preferences is in the constructor of bot context class, e.g.:

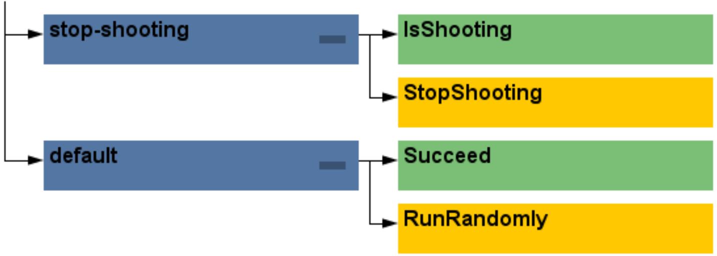
```
public AttackBotContext(UT2004Bot bot) {
        super("AttackBotContext", bot);
        // IMPORTANT: Various modules of context must be initialized.
        initialize();

        // INITIALIZE CUSTOM MODULES
       getWeaponPrefs()…;
       …
}
```

Tips

yaPOSH – ActionResult.FINISHED

- Action returning **ActionResult.FINISHED** in **run()** method tells POSH to re-evaluate plan immediately to search for a new action
- This can be used to your advantage (parallel actions), but has a caveat!
  - Consider plan, where **StopShooting** returns **ActionResult.FINISHED** in run method in following plan:



  - Makes sense, because as we send stop shoot command in **init()**, the action is done…
  - The problem is that the POSH re-evaluates the plan immediately to search for a new action and guess what it finds? **StopShooting** again. Why?
    - Because isShooting sense will be returning the same value it was before! The environmental state is not changed. The POSH re-evaluates immediately! We are stuck in infinite loop and no more environmental updates will ever come (even at first glance no exceptions raised).
- For these types of actions always return **RUNNING_ONCE** !
  - And in general – **ActionResult.FINISHED** is tricky, use it only when you know why are you doing it

Today's menu

1. Tips
   - Navigation
   - yaPOSH
2. **Capture the Flag (CTF)**

Capture the Flag (CTF)

Rules

- Players/bots are divided into two teams (red and blue).
- Each team has a flag in his base.
- The goal of the team is to capture the flag of the opposite team and bring it to their home base.
- When managed, the team scores 1 point.
  - Team can only bring opposite flag home and score a point, if the team flag is in team home base!
- If the flag is dropped it will be returned to home base after some time.

Pogamut CTF support

Bases & game status

- CTF module
  - this.ctf
- Where are the bases?
  - this.ctf.getOurBase();
  - this.ctf.getEnemyBase();
- Whats the game status?
  - this.ctf.canOurTeamScore();
  - this.ctf.canEnemyTeamScore();
- Am I winning?
  - game.getTeamScores();
  - info.getTeamScore();

Pogamut CTF support II

Flags

- **I want my flag!**
  - Flag is represented by **FlagInfo** object.
  - this.ctf.getOurFlag();
  - this.ctf.getEnemyFlag();
- **Is someone messing with my flag?**
  - this.ctf.isOurFlagHome();
  - this.ctf.isOurFlagHeld();
- **How about enemy flag?**
  - this.ctf.isEnemyFlagHome();
  - this.ctf.isEnemyFlagHeld();

Pogamut CTF support III

Team communication

- Use **SendMessage** command.

```
this.act.act(
      new SendMessage()

      .setTeamIndex(info.getTeam()).setText(“Help
”)
);
```

- Listen to team message with **TeamChat** event.

```
@EventListener(eventClass = TeamChat.class)
public void teamChat(TeamChat event) {
      …
}
```

- OLD AND SLOW

Pogamut CTF support IV
UT2004TeamComm 1/3

- Allows you to send Serializable Java objects between members of the team
- Allows you to specify “subchannels”
- You can easily listens to your messages as if they were `IWorldEvent` objects

Pogamut CTF support IV
UT2004TeamComm 2/3

```
@EventListener(eventClass=TCMessage.class)
public void allMsg(TCMessage tcMessage) {
    log.info("@EventListener(TCMessage)”);
}

@EventListener(eventClass=TCHello.class)
public void hello(TCHello hello) {
    log.info("@EventListener(TCHello)”);
}
```

Pogamut CTF support IV
UT2004TeamComm 3/3

```
public class TeamCommBot extends
    UT2004BotTCController<UT2004Bot>

<dependencies>
    <dependency>
      <groupId>cz.cuni.amis.pogamut.ut2004</groupId>
      <artifactId>ut2004-team-comm</artifactId>
      <version>3.6.1-SNAPSHOT</version>
    </dependency>
</dependencies>
```

Example available at:

- svn://artemis.ms.mff.cuni.cz/pogamut/trunk/project/Main/PogamutUT2004Examples/26-TeamCommBot

Assignment
(on Lecture)

- Create **CTFBot** in **yaPOSH**
  - Arm yourself before going into action!
  - Try to get enemy flag!
  - Try to get your flag, if it is stolen!

Assigment

Cheatsheet

- **Locations of interest**
  - this.ctf.getOurBase();
  - this.ctf.getEnemyBase();
- **Useful info about the game (could be senses)**
  - this.ctf.canOurTeamScore();
  - this.ctf.canEnemyTeamScore();
  - this.ctf.isEnemyFlagHome();
  - this.ctf.isOurFlagHeld();
  - this.ctf.isBotCarryingEnemyFlag();
    - Our bot
- Flag is represented by FlagInfo object
  - this.ctf.getOurFlag();
    - Can check isVisible()…

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 (Tuesday practice lessons)
    - jakub.gemrot@gmail.com
  - Michal Bída (Monday practice lessons)
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