OPERAČNÍ PROGRAM PRAHA ADAPTABILITA

EVROPSKÝ SOCIÁLNÍ FOND

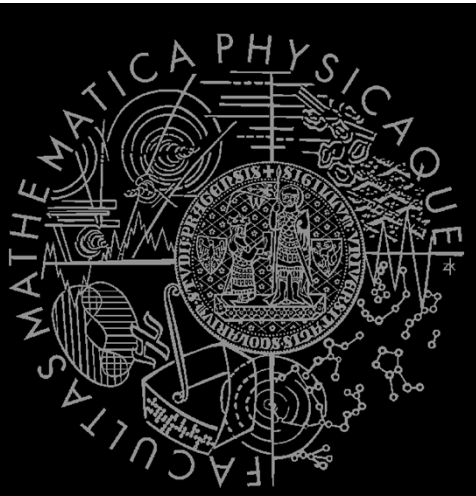
EVROPSKÁ UNIE

Pogamut 3
Lekce 2 - Úvod

PRAHA & EU

INVESTUJEME DO VAŠÍ BUDOUCNOSTI

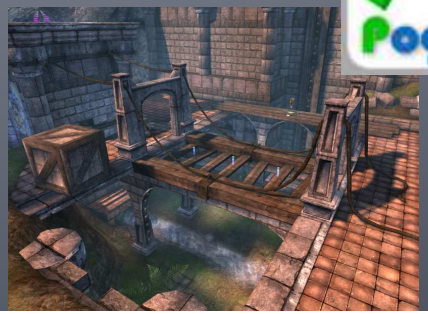
Faculty of Mathematics and Physics
Charles University in Prague
4th March 2013



UT2004 bots made easy!

Pogamut 3

Lecture 2 – Gentle introduction



Warm up

- Fill the short test for this lessons
  - 5 minutes limit

Virtual worlds

familiar

simplified reality

gravity

solid walls

simulated

communication

real-time!

Virtual humans

Intelligent virtual agents (IVAs)

needs

goals

motivations

rules

emotions

communication

real-time!

Our scope – UT2004, UE2

needs

goals

motivations

rules

emotions

communication

real-time!

Env. Classification
What can be said?

- Fully *vs.* Partially observable
- Episodic *vs.* Sequential
- Static *vs.* Dynamic
- Single *vs.* Multi agent
- Deterministic *vs.* Stochastic
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TicTacToe
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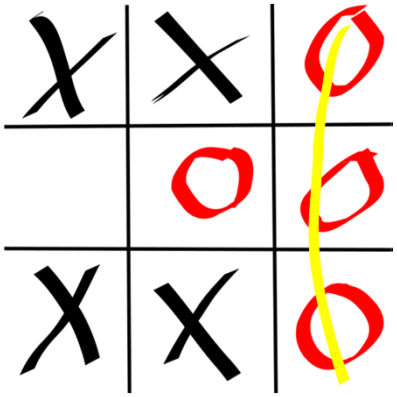

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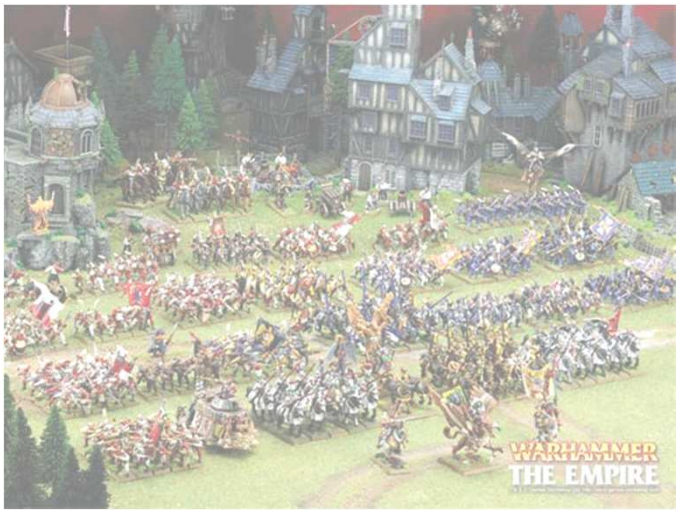

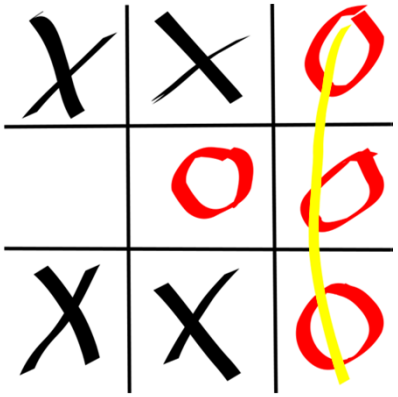

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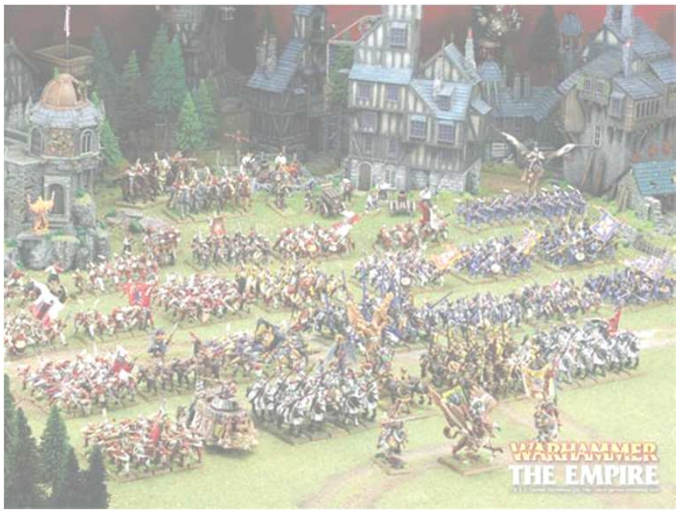

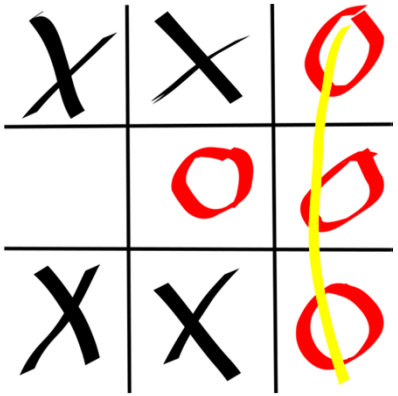

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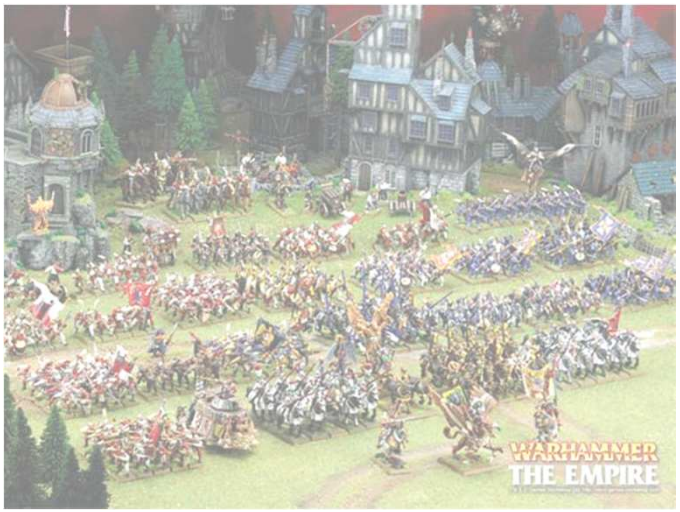

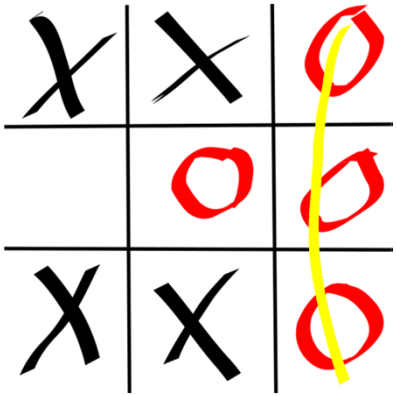

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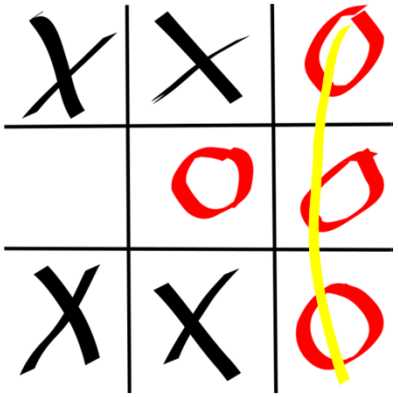

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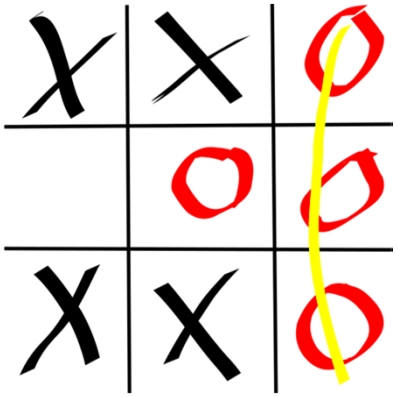

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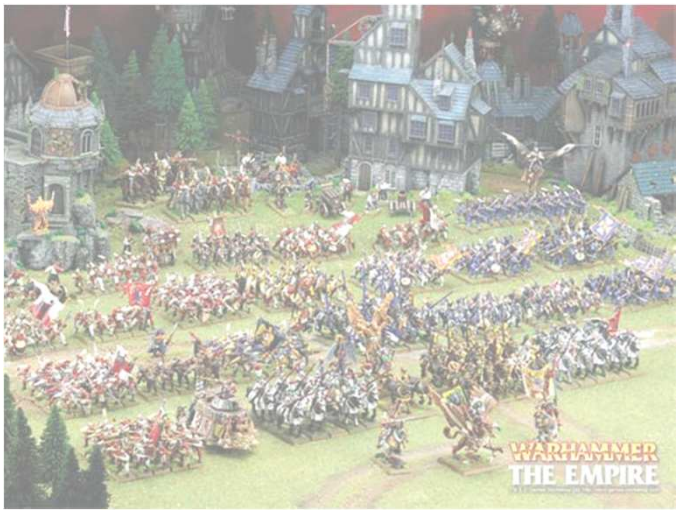

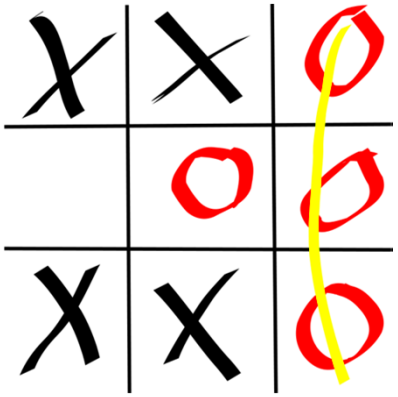

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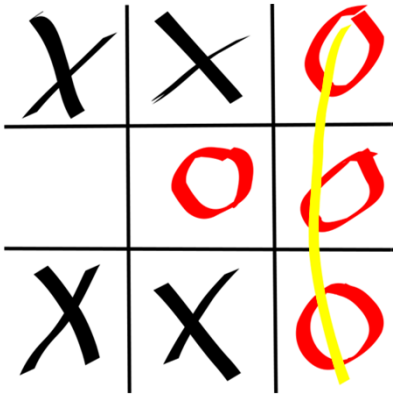

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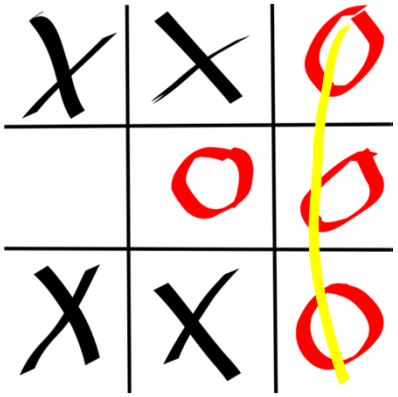

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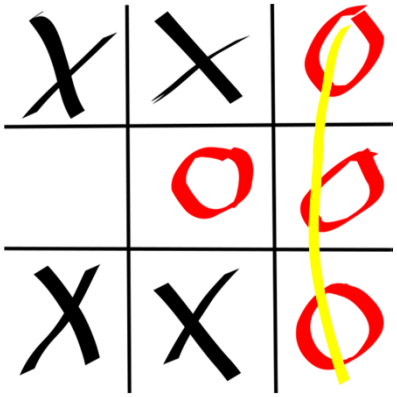

TicTacToe

What does it mean?

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- Episodic *vs.* Sequential
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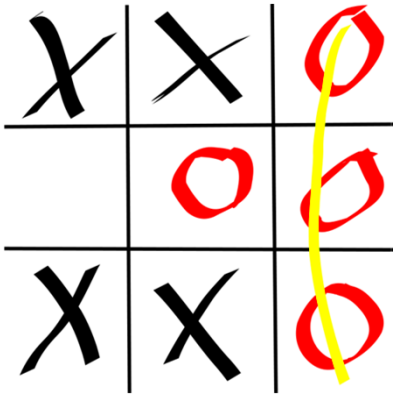
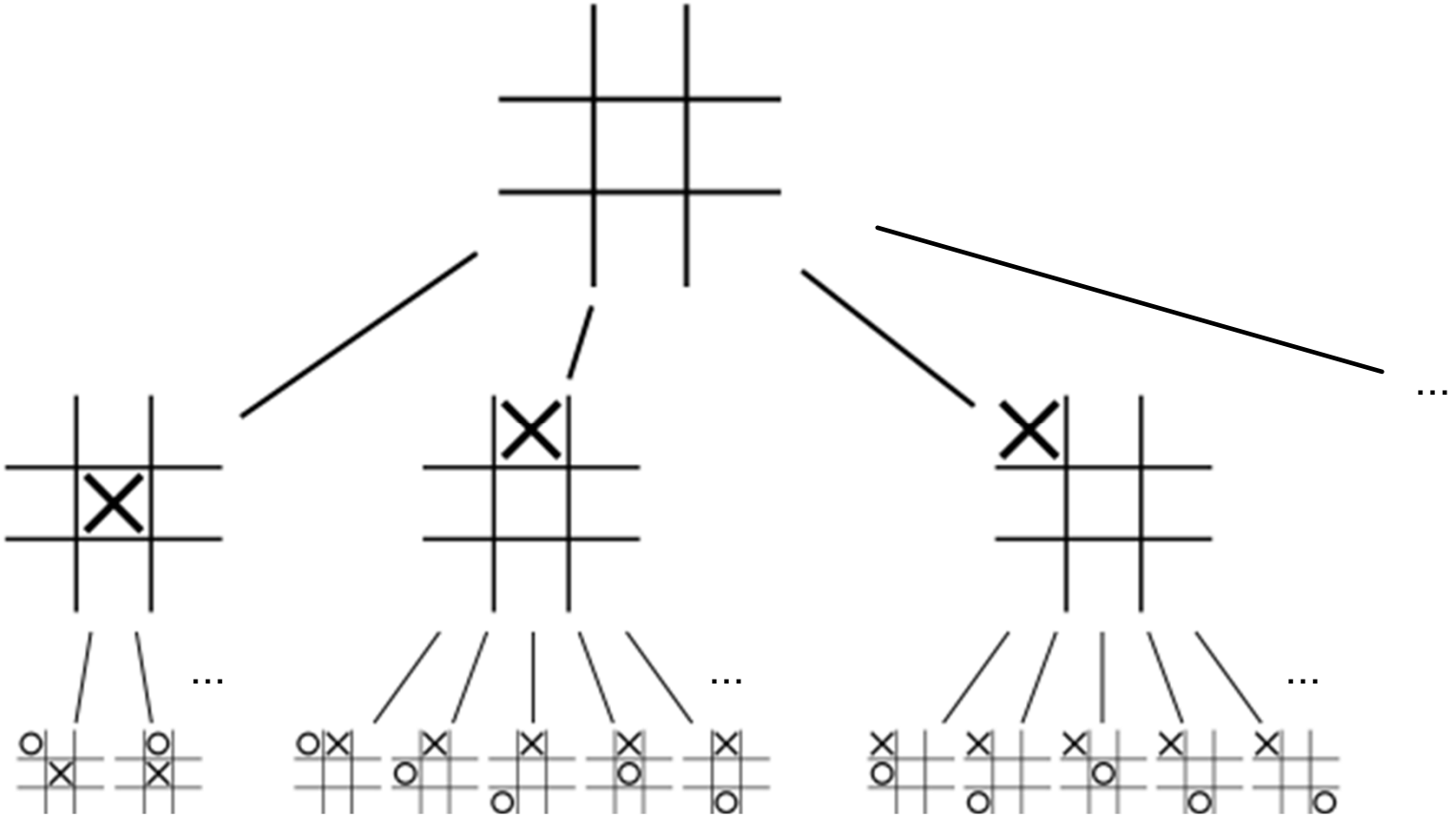


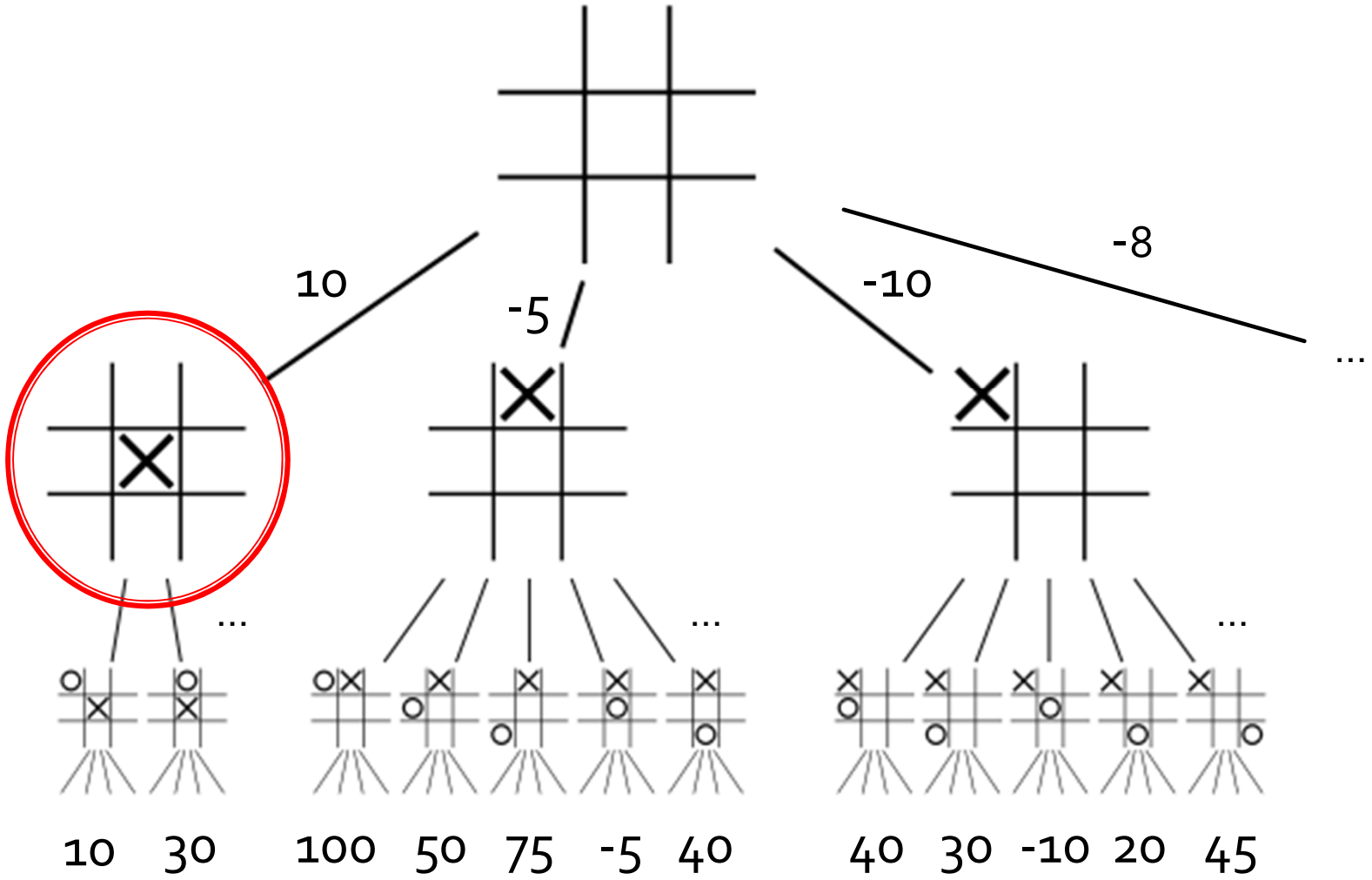
„Reasoning as search"

-- Alan Newell



„Reasoning as search"

=> MIN-MAX algorithm + modifications



Env. of UT2004?

- Fully *vs.* Partially observable
- Episodic *vs.* Sequential
- Static *vs.* Dynamic
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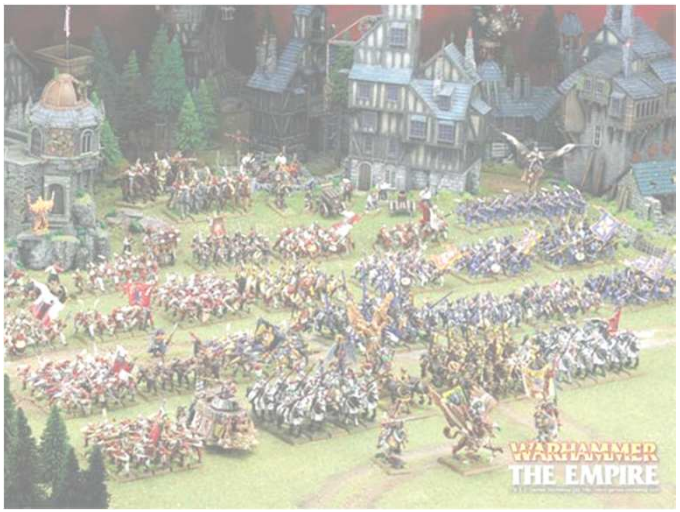
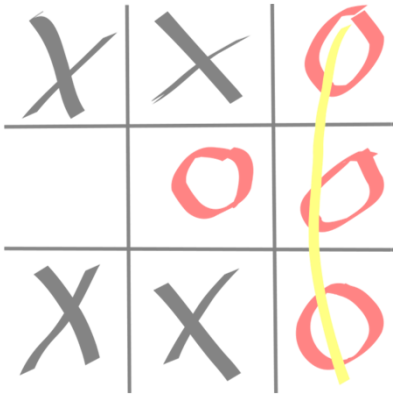
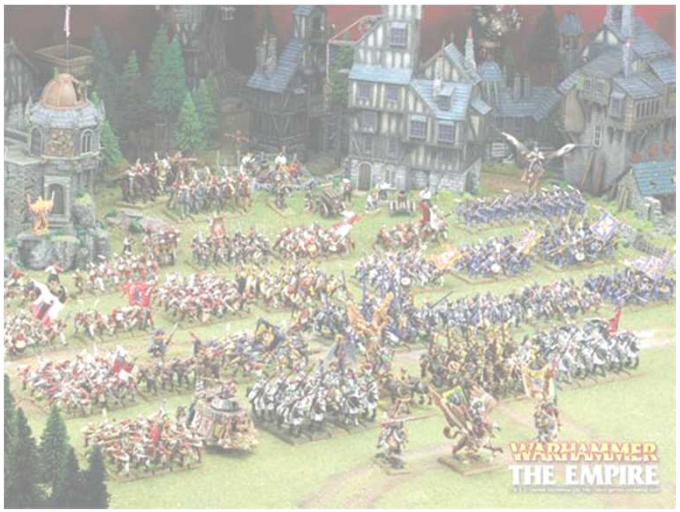


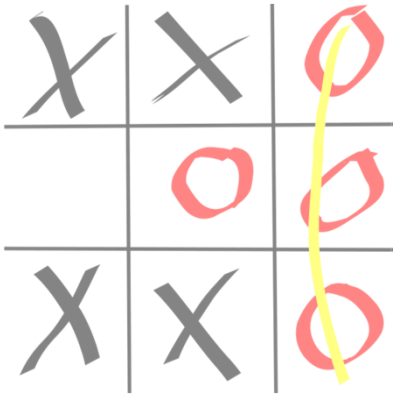


Env. of UT2004

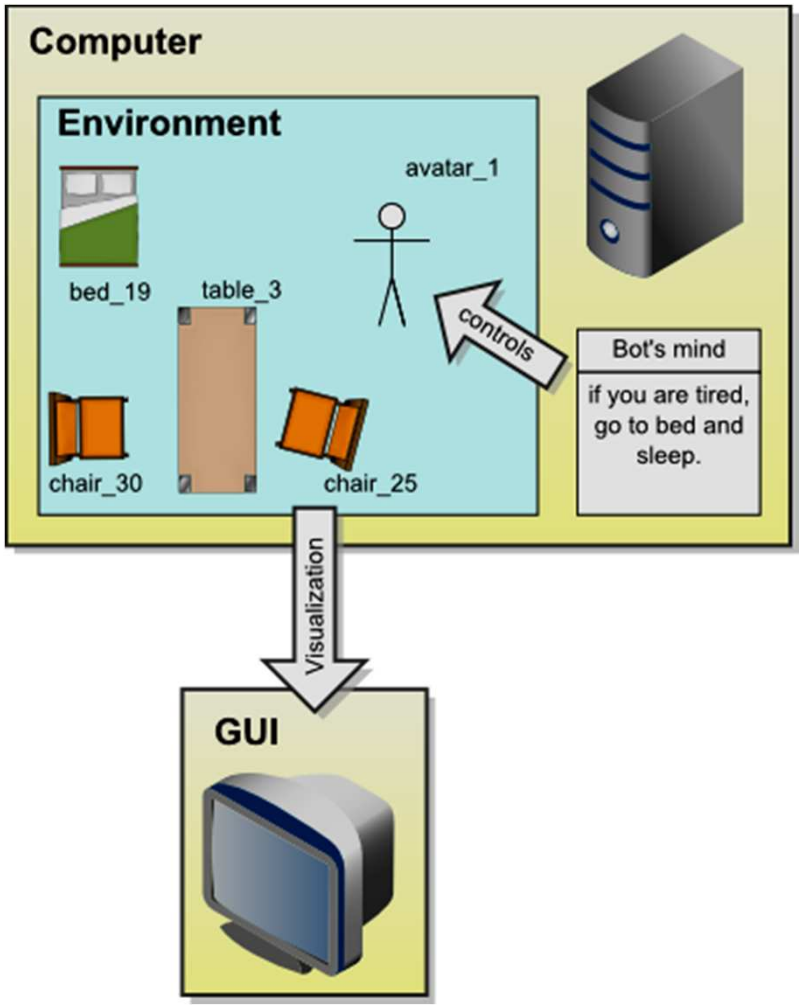
The (almost) worst case imaginable!

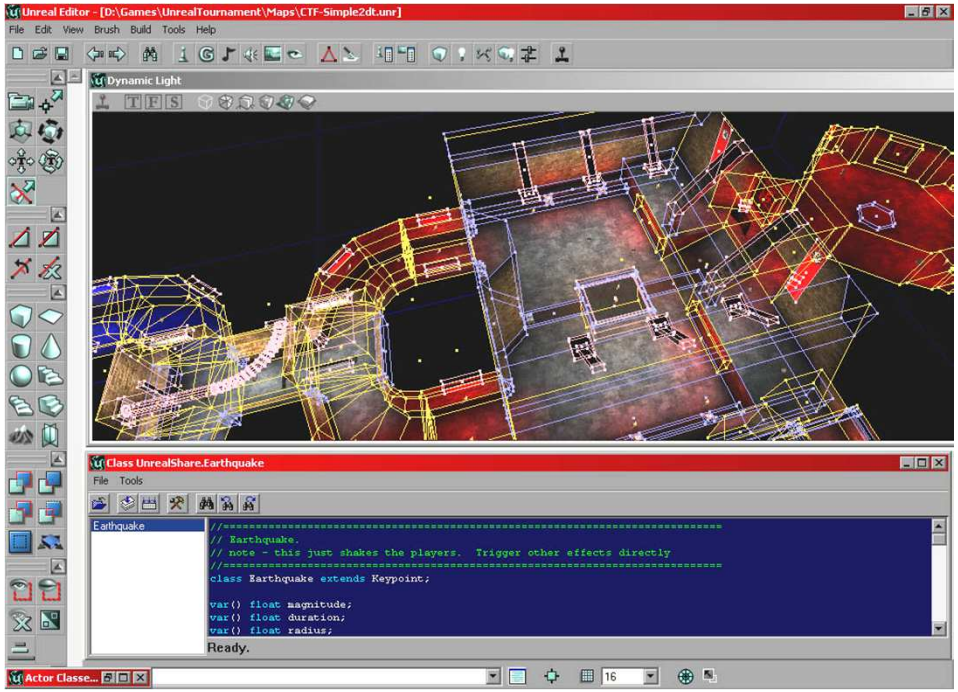
- Fully *vs.* Partially observable
- Episodic *vs.* Sequential
- Static *vs.* Dynamic
- Single *vs.* Multi agent
- Deterministic *vs.* Stochastic (weakly)
- Discrete *vs.* Continuous
- Known *vs.* Unknown (weakly)
- Turn-based *vs.* Real-time
- Noiseless *vs.* Noisy





Virtual worlds





IVAs and Virtual worlds

Environment state (E)

Memory (S)

Perception (P)

Action (A)

1. Part of environment state E is exported to the agent p(E) = P

2. Agent performs action-selection: f(P,S) -> AxS

3. Actions are carried out in the environment: a(A^n,E) -> E

IVAs and Virtual worlds

Environment state (E)

Non-complete information

Perception (P)

Memory (S)

Inaccurate

Action (A)

Actions mail fail!

Dynamic world

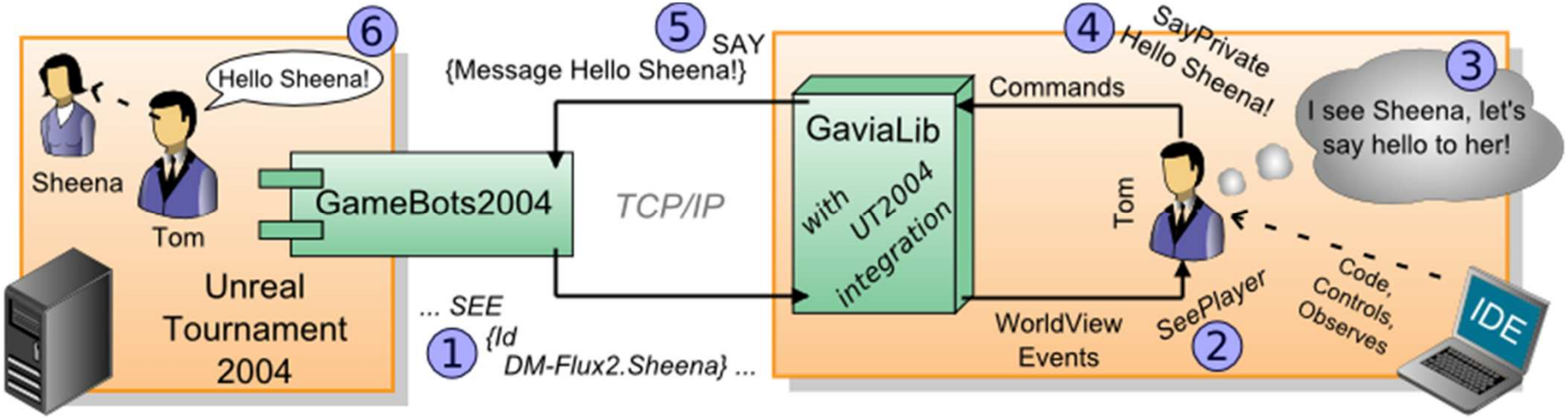
1. Part of environment state E is exported to the agent p(E) = P

2. Agent performs action-selection: f(P,S) -> AxS

3. Actions are carried out in the environment: $a(A^n,E) \rightarrow E$

Pogamut 3 platform

UT2004 and IVAs



UT2004 is providing action execution function *a*.

GameBots2004 mediates decisions to UT2004 and implements partial observability function *p*.

Pogamut 3 provides observe function *o*.

You have to supply reason function *r*, decide function *d* and possibly extra memory states S.

Decision Making Systems

- Reactive DMS
- Mushroompicker Cyril

Initial state: not_at_home AND picking_mushrooms

1. **IF** in_front_of_obstacle **THEN** change_rotation
2. **IF** full_basket **AND** picking **THEN** stop_picking
3. **IF** see_mushroom **AND** picking **THEN** put_it_to_basket
4. **IF** noon **AND** picking **THEN** stop_picking
5. **IF** at_home **THEN** end
6. **IF** picking **THEN** random_walk
7. **IF** not_picking **THEN** go_home

Pogamut World / Agent interface

- WorldView
  - A sort of working memory storing all the information bot knows about environment
  - Or a bot current overview of the world
  - Access by **this.world** or **this.getWorldView()**
- Act
  - Interface enabling to send bot commands – move to location, start shooting, jump, etc.
  - Access by **this.act** or **this.getAct()**

Pogamut API - basic

- In JavaDoc
  - http://pogamut.cuni.cz/pogamut_files/latest/doc/javadoc/
- Bot messages
  - Provide bot with information about environment
  - All of them are subclasses of **InfoMessage** object
- Bot commands
  - Allow bot to do things in environment (move, shoot…)
  - All of them are subclasses of **CommandMessage** object

Pogamut API – Bot messages

- Provide information about environment
- Two types
  - IWorldObject vs. IWorldEvent

- **IWorldObject** – persistent object in the game that is typically located (ILocated) and can be seen (IViewable)
  - Is stored in WorldView

- **IWorldEvent** – marks one event in the environment
  - Is not stored and can be missed
  - Listen to events through listeners

Pogamut web

Main web
- http://pogamut.cuni.cz/

JavaDoc (IMPORTANT!)
- http://pogamut.cuni.cz/pogamut_files/latest/doc/javadoc/

Lecture web
- http://pogamut.cuni.cz/pogamut-devel/doku.php?id=lectures

Tutorials
- http://pogamut.cuni.cz/pogamut_files/latest/doc/tutorials/

Pogamut manual installation Win32
- http://pogamut.cuni.cz/main/tiki-download_file.php?fileId=22

Pogamut on Linux (external)
- http://cicolink.blogspot.com/2011/11/unreal-tournament-2004-create-bot-with.html

Installation of Pogamut

Step 1: Install Pogamut

- Run Pogamut installer found in Download section at
  - **http://pogamut.cuni.cz**

Import bot project

Step 2: Create new bot project

- Follow the tutorial at:
  - **http://pogamut.cuni.cz/pogamut_files/latest/doc/tutorials/OpeningExamples.html**

Tutorial 1 – Empty bot

- Get the bot from our lecture site
- We look into the basics of Pogamut bot methods and API…
- See the tutorial:
  - http://pogamut.cuni.cz/pogamut_files/latest/doc/tutorials/EmptyBotTutorial.html

…

- Let's fool around ☺

Starting Pogamut Bot

1. Starting the game environment
   - UT2004 dedicated server
   - Start->Programs->Vyvojove Nastroje->Pogamut->run GameBots DM server
2. Starting the vizualizator (the game UT2004)
   - Start->Programs->Vyvojove Nastroje->Pogamut->run UT2004
3. Starting the bot itself
   - Inside NetBeans – right click the project and select Run

Tutorial 2 – Simple bot

- Listeners – listening to changes in the environment
- See the tutorial:
  - http://pogamut.cuni.cz/pogamut_files/latest/doc/tutorials/ResponsiveBotTutorial.html

…

- Let's fool around again!

Assignment (or HomeWork)

- Extend EmptyBot:
  1. To listen to the player commands
     - If I say "hi", bot responds
     - "Start following" – bot starts following
     - "Stop following" – bot stops following
  2. Remember last position of the player and if the player is lost, run to that location
  3. If the bot doesn't see the player, start turning around to scan your surroundings

Assignment (CheatSheat)

- Listen to **GlobalChat** event to receive text messages
- Use **SendMessage** command to send text messages to the game
- Module **this.players** holds information about other players in the game
- Module **this.move** provides basic locomotion commands

Send your assignments to

- Completely zip-up your project(s) folder
- Send it to:
  - Jakub Gemrot (Monday practice lessons)
    - jakub.gemrot@gmail.com
  - Michal Bída (Thursday practice lessons)
    - michal.bida@gmail.com

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