

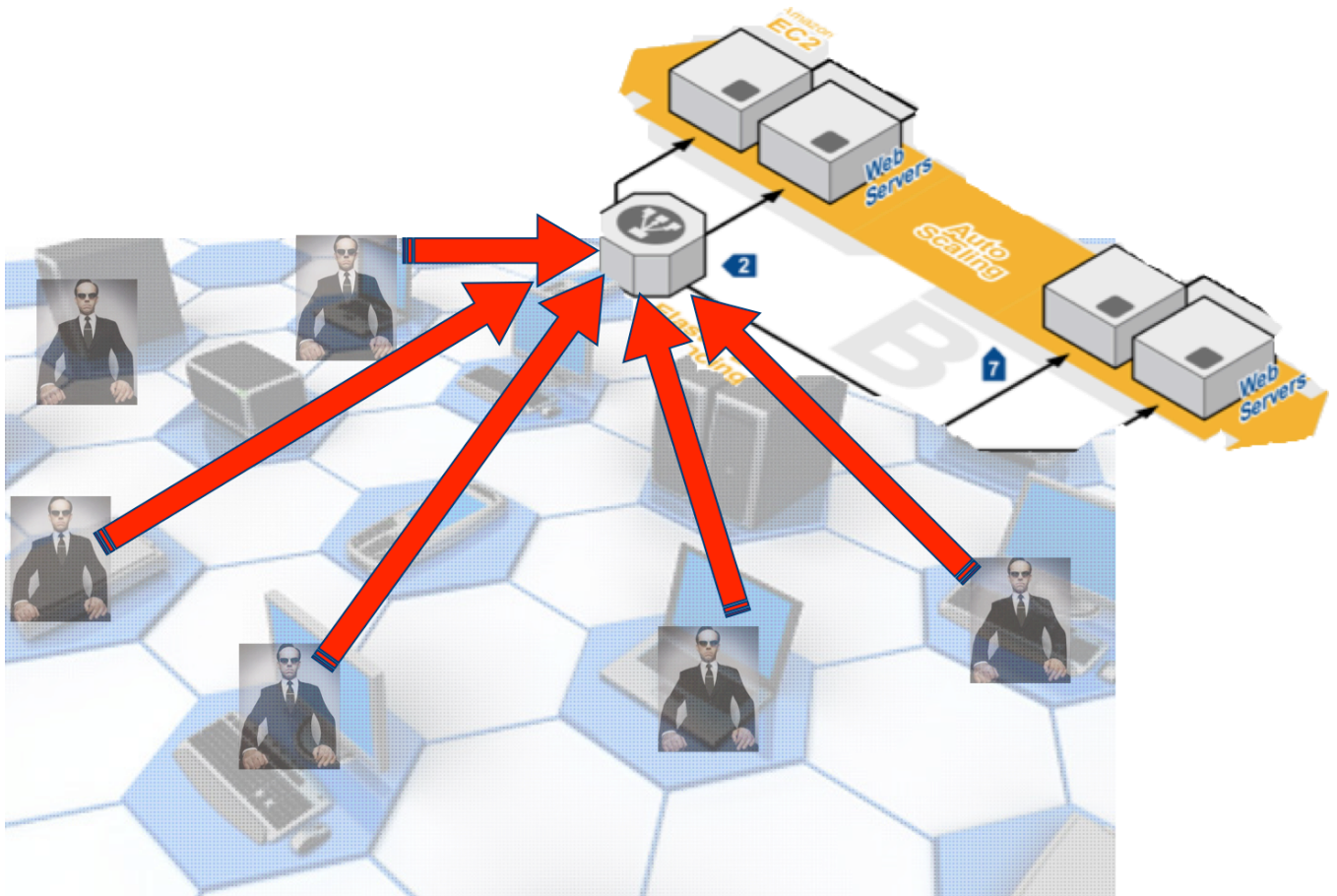
D7001D Network programming and distributed applications – LAB4

Agents: The Rise of Agents. MAXIMUM 100 points

The objective with this lab is to:

- Create a multi-agent system, which in a coordinated manner performs actions to achieve certain goal
- Create a scalable server architecture, which dynamically adapts to an increasing load and study its properties

The overall scenario



In this scenario you will in a controlled manner increase the traffic load towards a TCP server, which have to cope with the situation and adapt its performance dynamically. In this lab you have free hands for selecting a specific implementation approach. The only requirement is that your solution should implement the described below functionality.

Part I – The Agents Attack (30 % of full Lab points for the basic functionality, 10 % for extra features and original design)

In Part I you have to create a multi-agent system.

In this system there is one Coordinator Agent (The Architect), which has a GUI interface through which one should be able to control the population of attacking agents and their parameters.



The Architect (Coordinator) Agent creates an army of Soldier Agents (Agent Smiths). Agent Smith has a *Ticker Behavior* that periodically performs certain action. The duration of the period is a configurable parameter. The action, which Agent Smith performs is opening a TCP socket towards a TCP server.

➤ Propose and implement an Architecture

The architecture and its companion design report must include:

1. Coordinator agent, many instances of agent smith, machines and platforms where you are planning to run your agents and machine where you are planning to run your server (IP addresses, port numbers, platform names, container names etc. must be mentioned in your design report).
 - a. **Hint:** You can run your entire agents on a single port of a machine, or several ports of the same machine or several ports of several different machines. Which choice do you think is better? Well, EXPERIMENT is the basis of science :)
 - b. **Your system must be able to handle up to 10000 Agents Smith**
2. Mechanism to create and launch your agents, either manually or automatically from within your program. (Automatic method carries extra marks).
3. Types and contents of the messages passed between agents (design your messages), their senders and receivers and the expected respond to each one of them. It would be also a good idea to show the expected conversations between agents in a sequence diagram. Something that you have observed in Jade's Sniffer Agent window.
 - a. **Hint:** make your architecture simple (as simple as you can) but effective.
4. Describe your method of measuring and changing server and or network traffic, e.g. increasing the number of agent smiths vs. decreasing the interval in each agent's Ticker behavior

Deliverables:

1. Present the design of the target Multi Agent System and explain your architectural choices (there are several ways of implementing it)
2. Demonstration of the implemented Multi Agent system functionality.
3. Evaluate the performance of your MAS (how the host machine resources are used when increasing the number of Agents from 1 to 10000)
4. Save all measurement data in log files, present the results in form of tables. We will provide an Excel Sheet to log your data.

Part II – ¡No Pasarán! (30 % of full Lab points for the basic functionality, 10 % for extra features and original design)

This part of the lab concerns with dynamic scaling of the server, which has to cope with all increasing traffic. Take the TCP server which you have implemented during Lab 1. For each connection start a new processing thread, which performs a time consuming task (for example computing Fibonacci numbers – it's OK to re-use the code from the Internet).

Deliverables:

1. Present the design of your architecture along with the motivation (2 power point slides showing the architecture and a bullet list with explanations is sufficient)
2. Demonstrate the adaptation capabilities of your architecture.

Part III – The war of worlds (20% of full Lab points)

In this part you have to present your findings on the dependency of how your system adapts to different intensities of the attack (the number of agents, the period for connecting to the server, etc)

Open your mind! Good luck!



Detach now all your volumes, stop all instances and mark them and the AMI for deletion (change the name of the instance to: “delete-me-username”).