

COGSI - Configuração e Gestão de Sistemas
Mestrado em Engenharia Informática, Ramo Sistemas Computacionais
P5 - Integration

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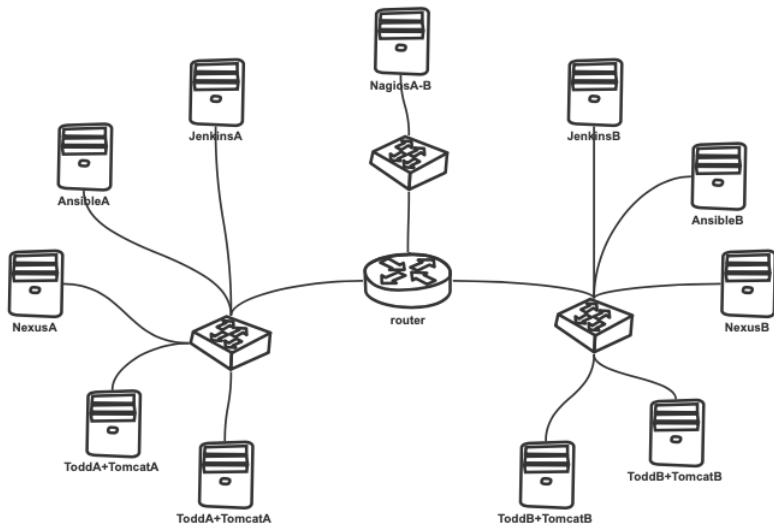
Dep. de Engenharia Informática – ISEP

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- **Start Date:** 3, May
- **End Date:** **12, June**
- **Development Repository:** Your individual repository
 - Create Issue(s) for your work
 - Expected several commits (at least 1 for each lab class!)
 - You should commit to the repository only files that you created or edited (e.g., do not commit the nagios directory!)
 - Documentation should be provided **only in the readme.md file related to the assignment!**
- **Notes regarding Evaluation of P5:**
 - P5 stands for 30% of the final grade (no minimum score)
 - This exercise can be developed by **teams of 2 students**

- The topic of this assignment is the **integration** of all the tools and technologies used previously as well as the new ones for this component (i.e., Ansible, Jenkins and Maven/Nexus).
- The overall goal is to simulate an integrated "devops" scenario using as a base virtualization tool **Docker** or **Vagrant**.
- Monitoring should be done using **Nagios**, **JMX** and **NRPE**. All the hosts and services (i.e., Tomcat and Todd) should be monitored in both active and passive modes.
- One main concern of this assignment (that is also core in "devops") is to treat **infrastructure as code**.
 - So, you should try as much as possible to achieve this goal;
 - The artifacts in your repository should be sufficient to build the application and also the infrastructure that will run it.
- For this assignment we will also be using **Jenkins** and **Nexus**.
 - The idea is to implement a pipeline for the continuous integration of the **Todd** application.
 - This pipeline should be implemented in Jenkins and include the continuous delivery of the application by publishing it (in Nexus) and eventually deploying it (with **Ansible**).
- You should use, as much as possible, **Ansible** to configure and deploy all the hosts (e.g., Nagios, Tomcat, Todd, Nexus, Jenkins)

P5: Network Simulation Overview



If the exercise is **developed by a team**:

- Each student develops one of the networks: A (left) or B (right)
- The Nagios host is to be shared by both team members
- Nagios should monitor all the hosts (from networks A and B)
- Students should integrate the work using a router (or a host that simulates a router)

If the exercise is **developed individually**:

- The student develops totally **only one** of the networks: A (left) or B (right)
- The student uses NagiosA-B to implement Nagios
- The student should also use a router (or a host that simulates a router) to connect the network containing Nagios with the network containing the other hosts

Continuous Integration

- You should use Jenkins to implement a pipeline to build the Todd application (located in your individual repository)
- You may follow the example available in the Todd repository (<https://bitbucket.org/mei-isep/todd>).

Continuous Delivery

- Successful builds of the application should result in the application being archived in the Nexus artifact repository
- It should also be possible to deploy the application to all the related hosts, as depicted in the previous diagram
- This should be done using Ansible
 - You should try to include a stage in the pipeline that, upon user confirmation, executes the Ansible deployment of the application

Network

- All the hosts should be connected
 - You may reuse the assignment of GNS3 or implement the local network using the features of Docker or Vagrant
- The network should include the hosts presented in the previous diagram (or a simplification of them)

Virtualization

- To simulate hosts you may use Docker or Vagrant.
- It is not mandatory to use GNS3 (but you should try to use it)

Configuration Management

- To deploy the Todd application you must use Ansible
- Ansible should make sure the requirements for the application are present (e.g., java)
- Ansible should also apply the necessary configuration so that Nagios is able to monitor the Todd server status and an event handler to try to automatically restart it in case of failure
- You should try to install, setup/configure all the software (e.g., Jenkins, Nexus, Tomcat, etc.) using Ansible.

Monitoring

- Nagios should be used to monitor all the hosts
- You should also use JMX and NRPE where possible

- For this assignment you may explore alternatives on how to implement the continuous deployment or the configuration management topics of the exercise.
- For instance, using different approaches in the pipeline; using different artifact repositories; using containers to package the application, using alternative tools to Ansible, etc.

P5: Technical Report and Included Artifacts

You should produce a **technical report** documenting your assignment.

- **Each student of the team should produce his/her own individual report!**
- If you work in a team, you may work mainly in a specific individual repository but **each student should replicate the development in his/her own individual repository.**
- The technical report **must be produced** in the **readme.md** file located in the repository folder related to P5 (e.g., 1133224-maria-ferreira/p5/)
- The report should include:
 - The Analysis of the Problem
 - The Design of your Solution
 - Present an overview of the tools (e.g., software used, major concepts, major processes, architecture of the tools)
 - Present an overview of the solution (e.g., the architecture and major configurations required)
 - The Steps required to Reproduce your Solution (it should include references/links to configuration files, scripts or code included in the same folder of the repository)
- You may also include:
 - Justification of Design Options
 - Analysis of the Alternative
 - The Steps required to Reproduce the Alternative