

Instituto Superior de Engenharia do Porto (ISEP) Departamento de Engenharia Informática (DEI) Mestrado em Engenharia Informática (MEI)

Área: Arquitectura, Sistemas e Redes
Sistemas Móveis (SIMOV)

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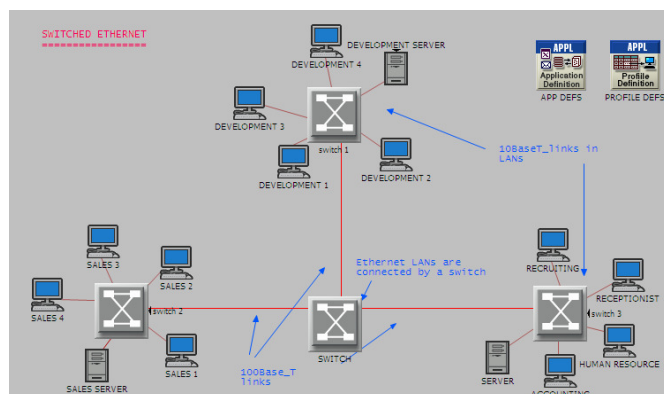
Local Area Network (LAN)

1. Introduction

The main goal of this tutorial is to introduce the OPNET Simulator. For that purpose we will use an Ethernet-based Local Area Network (LAN).

2. Network scenario

The network scenario is composed by three LAN segments: Development, Sales and Management. Each department is composed by four workstations and a server. These devices are all connected to an Ethernet switch. All these connections are based in 100Base T Ethernet links. All LAN segments are also connected to an Ethernet switch (SWITCH) using 100Base T Ethernet links.



The workstations are configured to generate different types of application traffic, such as FTP, Email and Database access.

3. Objectives

In the final of this lesson the students must be able to build a network scenario using the OPNET Modeler and also:

- Set up application and profile configurations as well as the node configuration.
- Collect statistics about network performance
- Analyze the collected statistics.

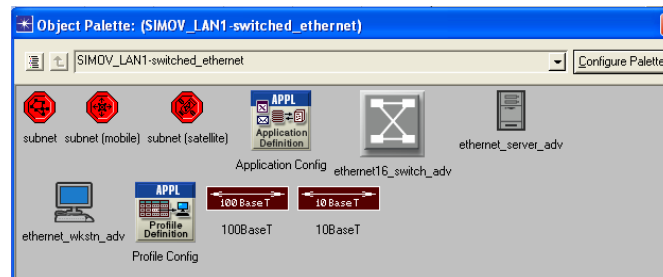
4. Getting Started

1. Create a project (see **Basics of OPNET** document)

2. Create an Object Palette (see **Basics of OPNET** document) with the following elements:

- Node models:
 - o Application Config
 - o ethernet16_switch_adv
 - o ethernet_server_adv

- ethernet_wkstn_adv
- Profile Config
- Link models
 - 100BaseT

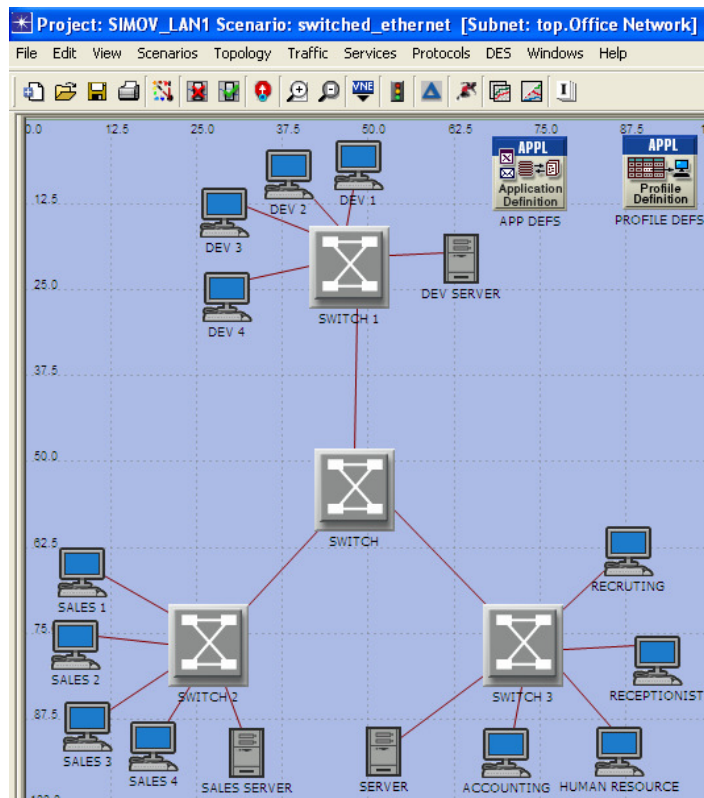


3. Create a Network

3.1. Build a network

3.1.1. Drag the node and link models according to the network scenario presented in the following figure.

3.1.2. Name the objects with the names presented in the figure. Right-click on the object and select **Set Name**



3.2. To Configure the Application Configuration Object (see *Basics of OPNET* document). Follow these steps.

3.2.1. Open the object palette if it is not already open.

3.2.2. Drag an **Application Config** object to the project workspace.

3.2.3. Right-click on the new object and select **Edit Attributes**.

3.2.4. Set the **name** attribute to **APP DEFS**.

3.2.5. Change the **Application Definitions** attribute to **Default** by clicking in the attribute's Value column and selecting **Default** from the drop-down list.

3.2.6. Click **OK** to accept the changes and close the **Attributes** dialog box.

3.3. To Configure the Profile Configuration Object (see *Basics of OPNET* document).

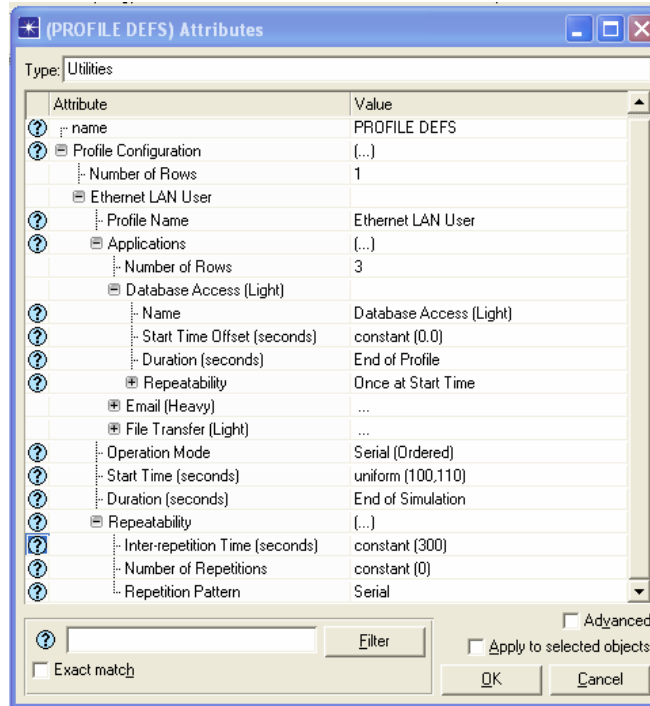
Follow these steps.

3.3.1. Drag a **Profile Config** object from the object palette to the project workspace.

3.3.2. Right-click on the object and select **Edit Attributes**.

3.3.3. Set the **name** attribute to **PROFILE DEFS**.

3.3.4. Configure **Profile Configuration** according to the following figure.

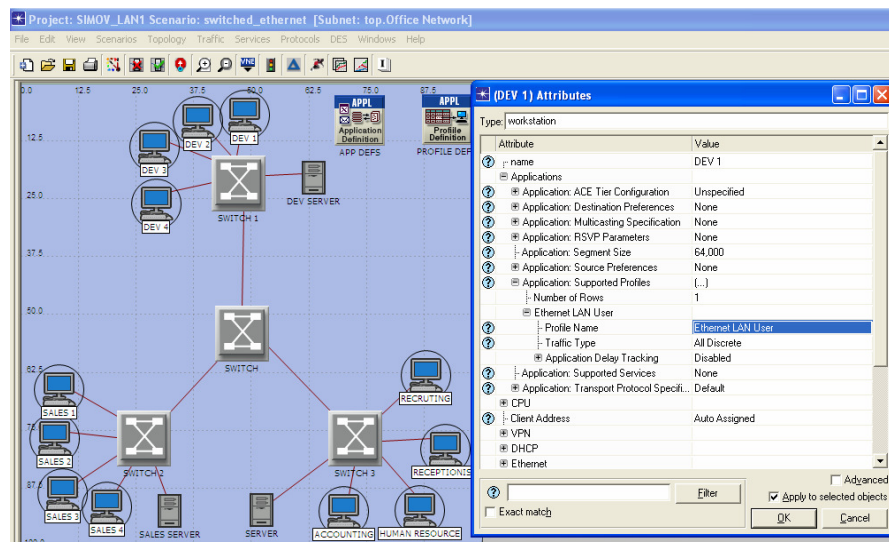


3.4. To Configure the network objects Follow these steps

3.4.1. Configuring the **workstation** applications. Select all workstations, right-click on one workstation and select **Edit Attributes**.

3.4.2. Set the **Application: Supported Profiles** with the defined profile (in the Profile Definition object) Ethernet LAN User.

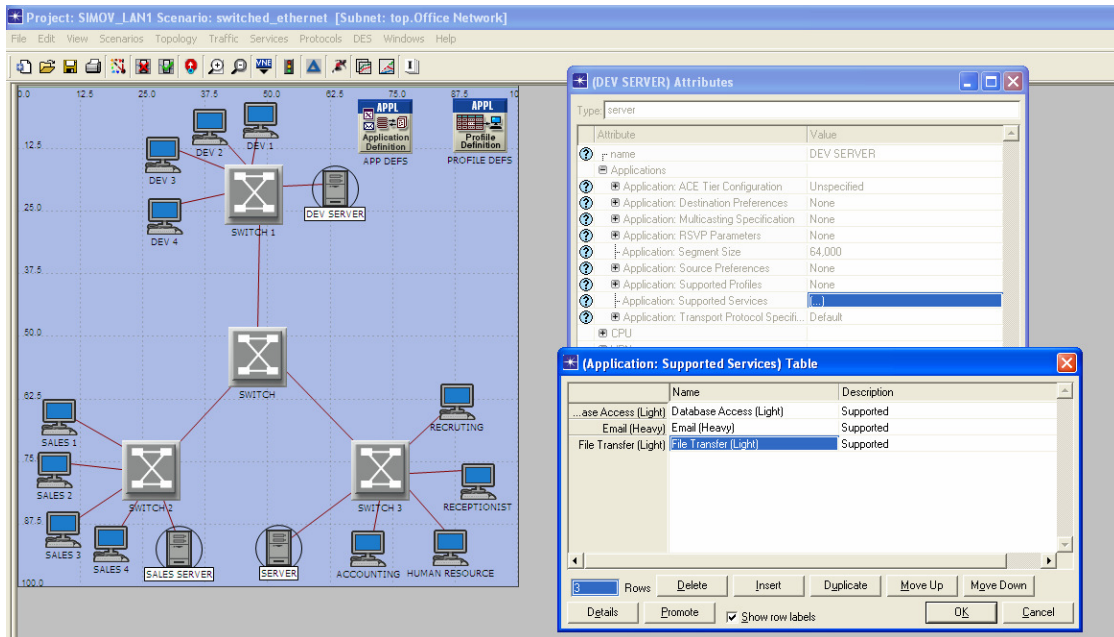
3.4.3. Do not forget to check “Apply to selected objects” and then click **OK**.



3.4.4. Configuring the **server** applications. Select all servers and right-click on one server and select **Edit Attributes**.

3.4.5. Set the **Application: Supported Services** with three services: Database Access (Light); Email (Heavy); File Transfer (Light).

3.4.6. Do not forget to check “Apply to selected objects” and then click **OK**.



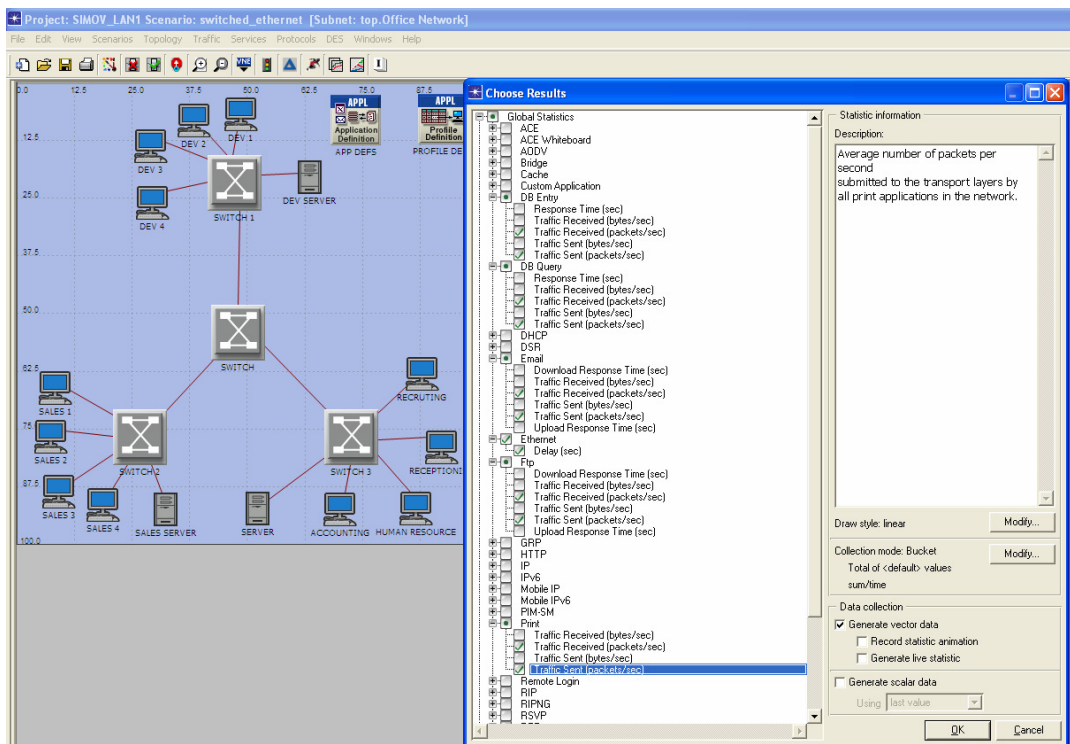
4. Collecting Statistics

4.1. Global Statistics

4.1.1. Right-click in the workspace (but not on an object) and select **Choose Individual DES Statistics** from the Workspace pop-up menu.

4.1.2. Expand the Global Statistics hierarchy.

4.1.3. Select the data collection according to the following figure.



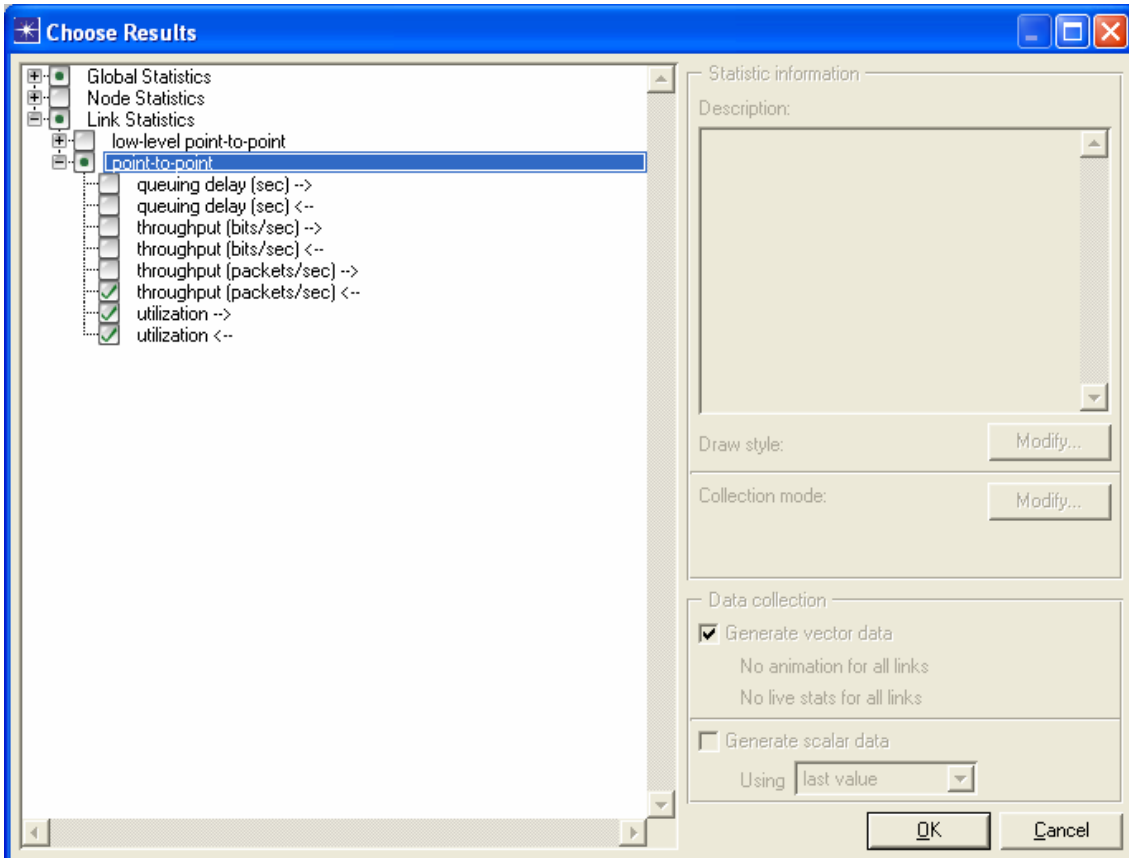
4.1.4. Click OK to close the Choose Results dialog box.

4.2. Link Statistics

4.2.1. Right-click in the workspace (but not on an object) and select **Choose Individual DES Statistics** from the Workspace pop-up menu.

4.2.2. Expand the Link Statistics hierarchy.

4.2.3. Select the data collection according to the following figure.

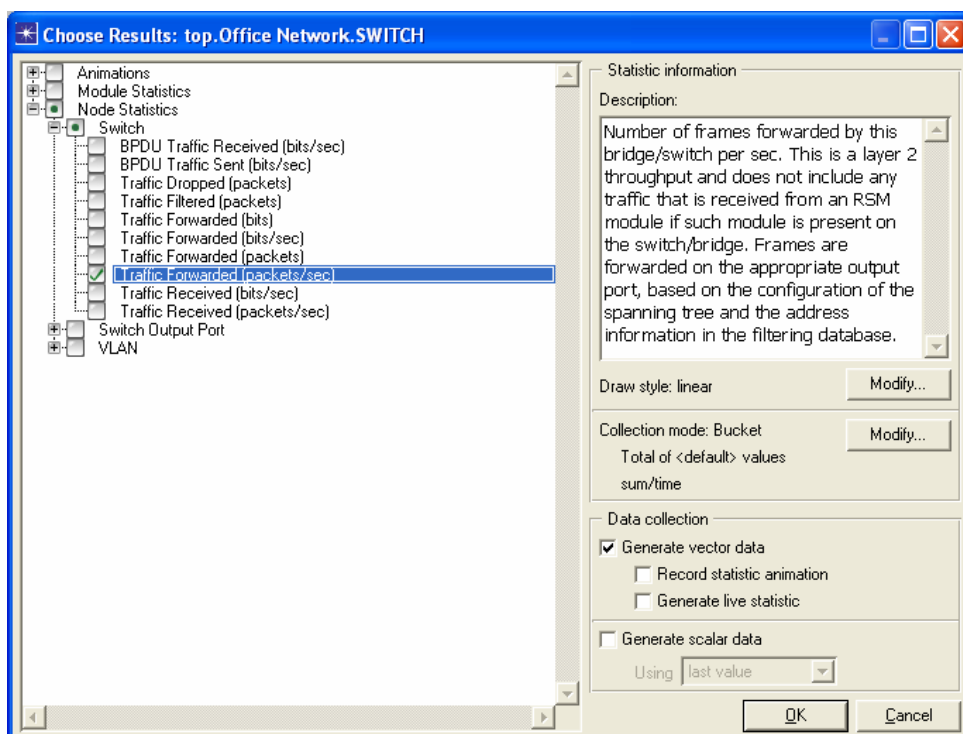


4.3. Node Statistics

4.3.1. Right-click on the SWITCH node and select **Choose Individual DES Statistics** from the node pop-up menu.

4.3.2. Expand the Node Statistics hierarchy.

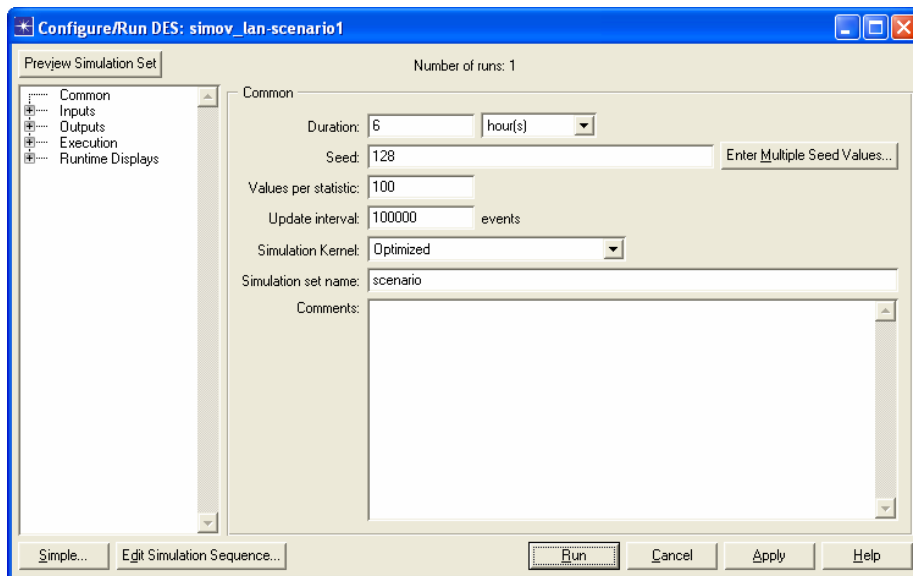
4.3.3. Select the data collection according to the following figure.



5.Run Simulation

1.Run a simulation

- 1.1. Select DES > Configure/Run Discrete Event Simulation...
- 1.2. Type **6** in the **Duration:** field to simulate 6 hours of network activity.
- 1.3. Type **10000** (events) in the **Update interval:** field to specify how often the simulation calculates events/second data. In this case, the simulation calculates and displays events/second data at 10,000-event intervals. The default setting for this is 500,000 for larger network simulations.
- 1.4. Set the Simulation Kernel to **Optimized**. You can use one of two types of kernels to run your simulation. The development kernel collects simulation data you can use to debug your models, but the optimized kernel runs faster.
- 1.5. Click the **Run** button to begin the simulation. While the simulation runs, a dialog box appears showing the simulation's progress.



6.Analysing Results

1.Analysing Results

- 1.1. Right-click in the workspace (but not on an object) and select **View Results** from the Workspace pop-up menu.
- 1.2. Check the statistical option that you want analyse.

