CSG 1105 - Applied Communications
Week 2 Tutorial

Objectives
- Learn how to create a logical & physical network topology and the icons associated with hardware
- Learn how to configure a switch at a very basic level

By the end of this workshop you should be able to
- Create a logical & physical network topology
- Be able to translate a network topology into the implementation in Packet Tracer
- Configure a switch and verify network connectivity from end devices

Scenario

Wendigo Engineering has been having some network troubles since their new network was implemented. Most of the time they have been able to use the new network to communicate and use the Internet just fine, but sometimes they just get connectivity issues. They believe it is because all of their networking hardware are Hubs. They are contacting you to propose a solution to this issue. You have suggested they replace the Hubs with Switches. Before they allow you to implement this, they want to see a Logical Network Topology showing how the network will work.

Tasks
- Create a logical network topology showing the following
    - End Devices (the computers)
    - Networking Devices (the switches)
    - IP Address Range & Subnet Mask
- Implement this new topology in Packet Tracer making use of Switches

Topology Process
1. Ensure you have Visio or Word installed and have downloaded the Visio Cisco Icon Pack from Blackboard. For the instructions here I will be using Visio (you can obtain this from MSDNAA).
    - If you are using Visio, the easiest way to access your stencils is to click on the left side where it says 'More Shapes >' then click on 'Open Stencil' and choose the one you downloaded from Blackboard.

2. The icons you will want to use for this task will be the following two. They are called a 'Workgroup Switch' (left) and a 'Workstation' (right) for when you're searching for the icons in the Visio Stencil. If you're working in Word, you can simply place the icons from the zip file on Blackboard.

3. Create a Logical Network Topology with the following information. Step by step information is provided below.
  - 6 Computers, 3 for Software Engineering and 3 for Mechanical Engineering
 - 2 Switches to replace the Hubs currently in use

4. I'll start with the switch. So we'll drag the switch icon onto the Visio Workspace, and double click on it to give it a name. I'll call mine 'SESwitch'. Do this again for the second switch.
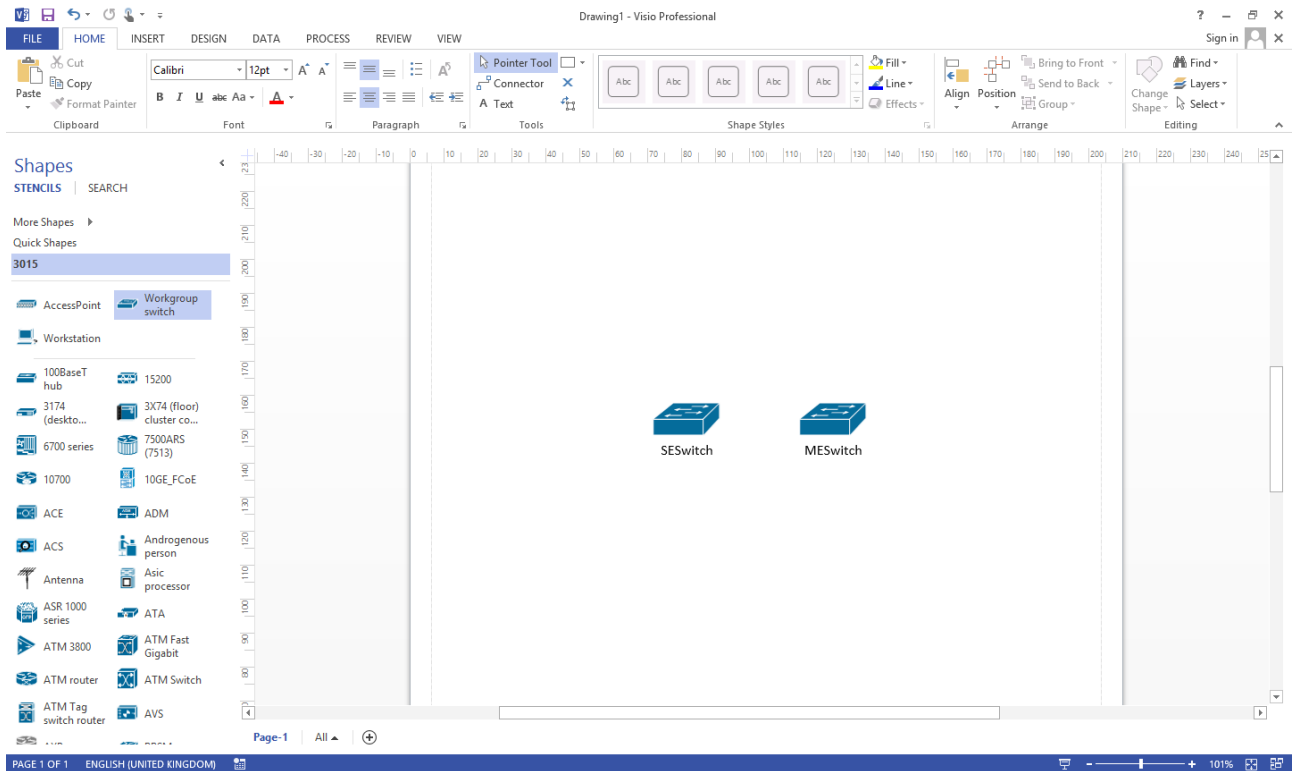
5. Now, drag your end-devices into the workspace as well; just like in week 1, there should be 3 for Software Engineering, and 3 for Mechanical Engineering. In a logical network topology there is no need to name every end-device and assign it it's IP Address. Instead, we show the IP Address Range and the Subnet Mask. So, if we continue with the same IP Addresses as week 1 our range is 192.168.0.0. The second 0 indicates this is the network we are using, each device will have this. Our subnet mask is still 255.255.255.0. See below for this in action.
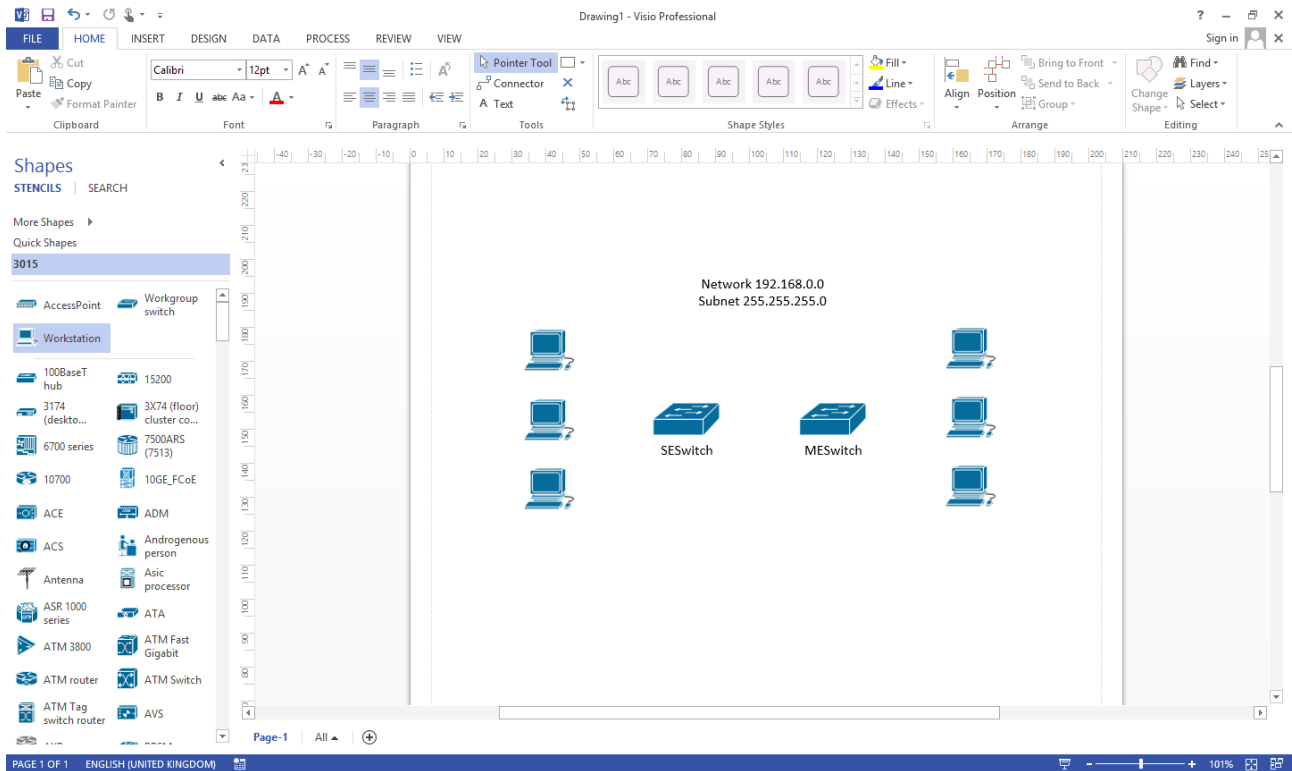

6. Now connect these devices with the Connector tool (highlighted towards the top in the picture) and do the same thing for the other 5 end-devices and the switches.
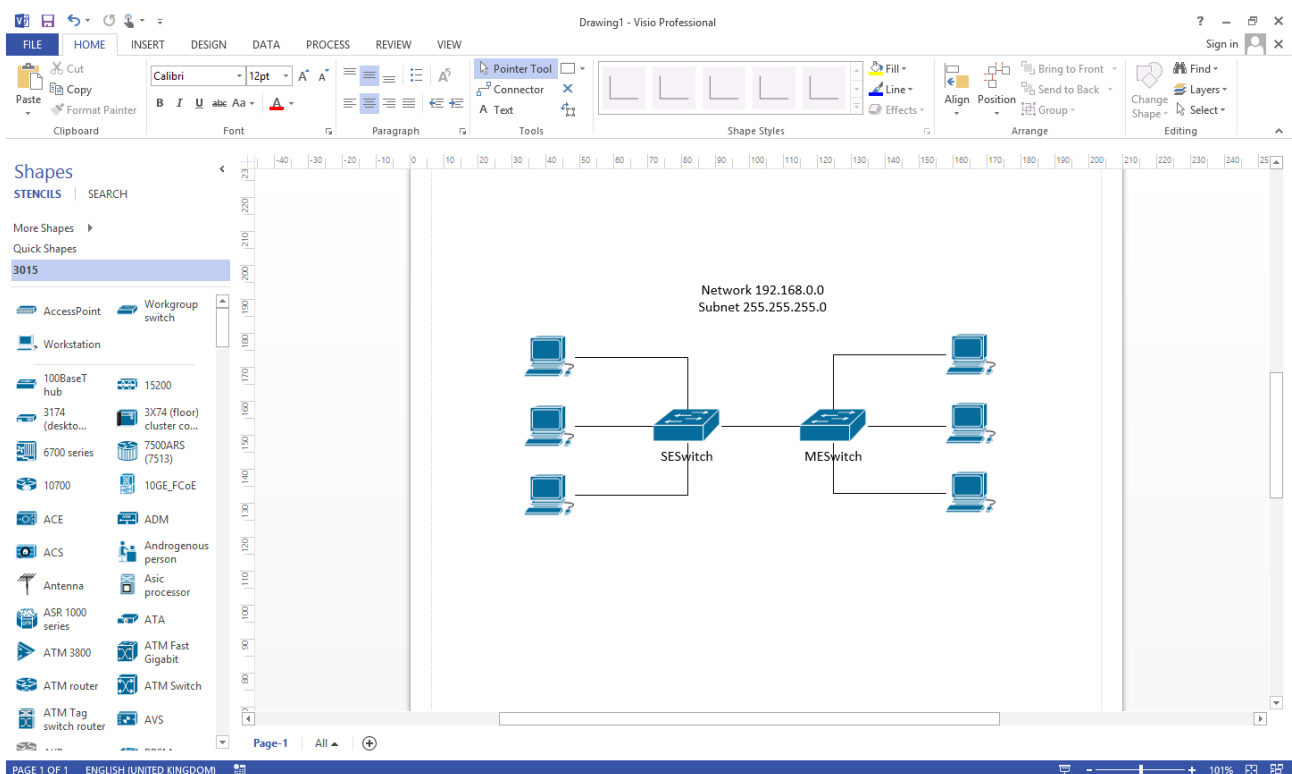
7. Now to implement the physical aspect of the topology. We know that we have 2 rooms for the different teams (from last week) so we need to show that they will be in different areas. This is done by separating the networks (like we already have) and simply labelling them - like below.
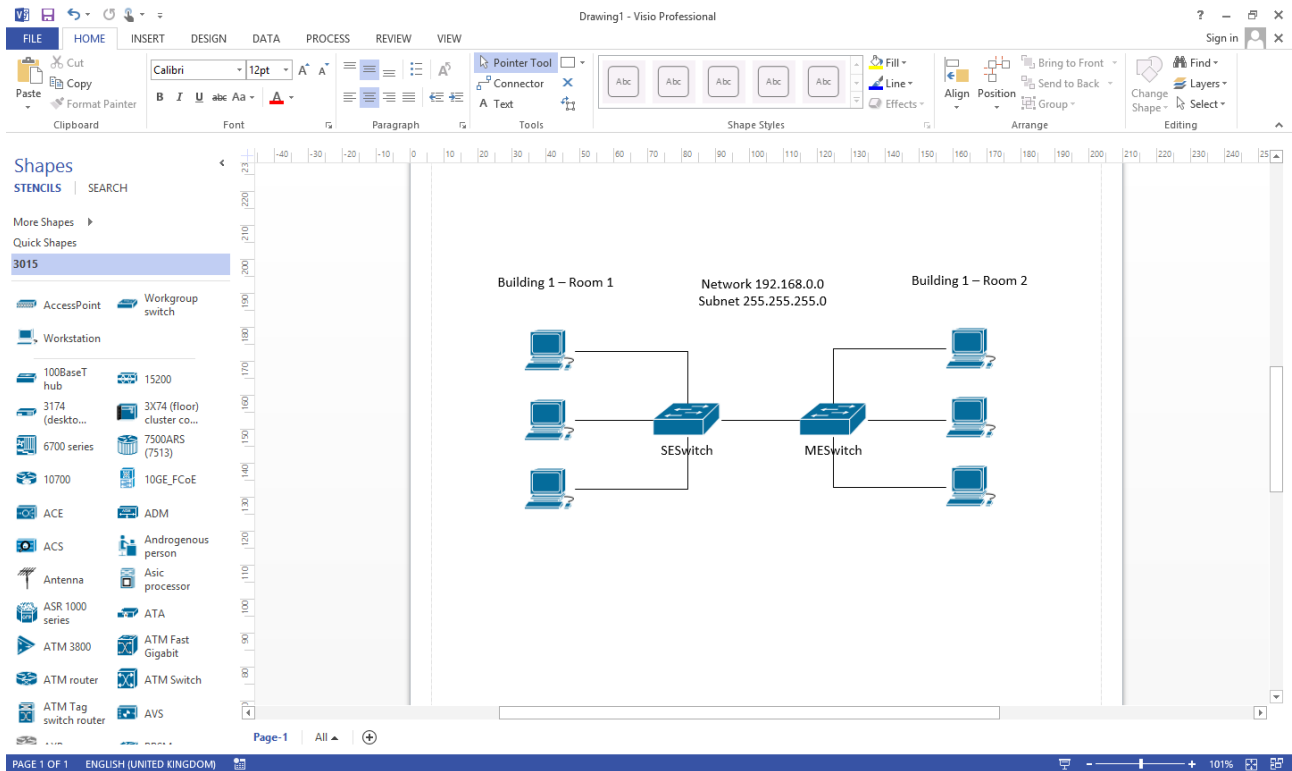

8. To ensure we have full security and privacy policies in action, we need to make it so the Software Engineering team and Mechanical Engineering team are separated virtually. The way this is done is by assigned VLANs (Virtual LANs) to the different ports on the switches. For now, all we want is a label stating what VLAN the machines will be on. As you can see in the next image, I've used 'Software Engineering VLAN' and 'Mechanical Engineering VLAN'.
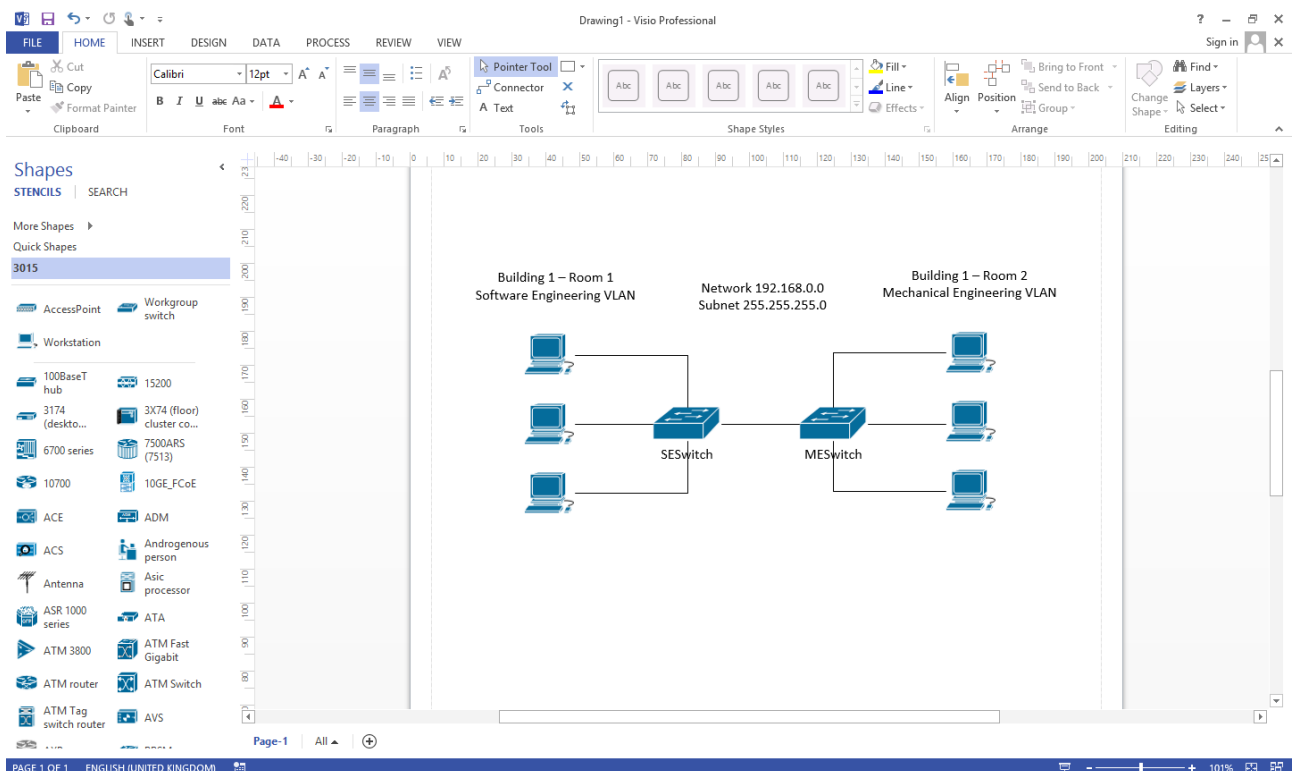
You've made your first topology! Congratulations.

Implementation Process
1. Open up last weeks Packet Tracer file, if you saved it, otherwise simply follow the steps from last week to build the network again (you can leave out the hubs).

2. Remove your hubs from your Packet Tracer project if you are using last weeks one.
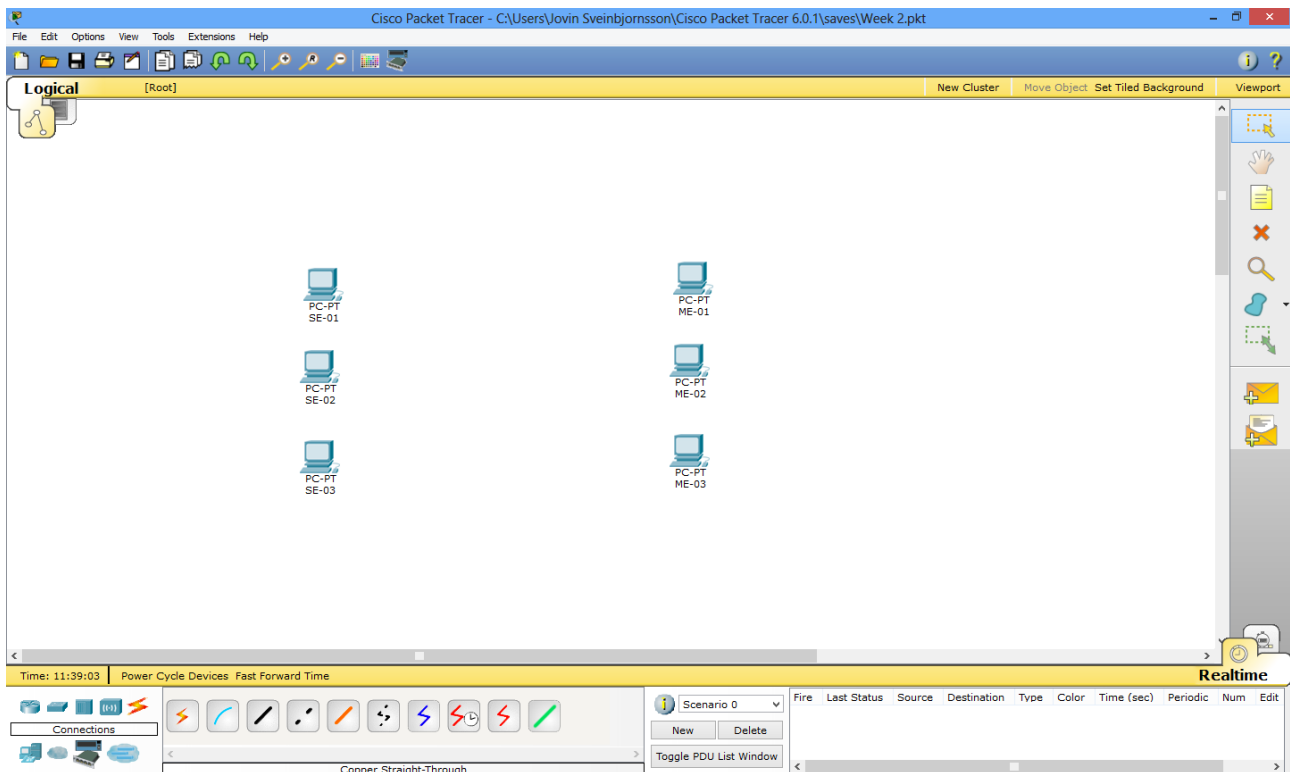

3. We'll be making use of the Switches in this weeks tutorial, you can find them in the Switches tray on the bottom left. We'll only use the 'Generic' one (located fourth from the left).
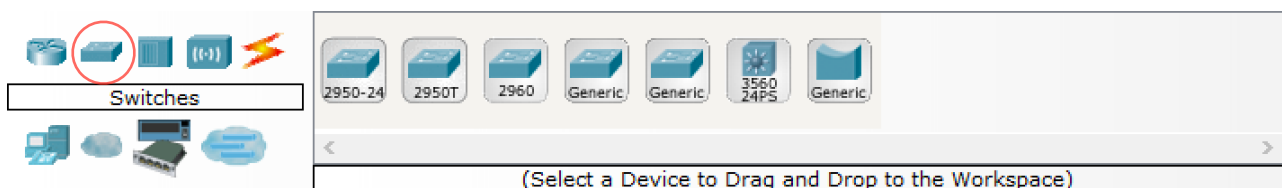
4. Drag two of these onto the logical space to replace our original hubs and give them their appropriate names of 'Software Engineering' and 'Mechanical Engineering'.

5. Then connect the workstations to the switches using Straight-Through cables (as they are different devices), and the switches to each other using Crossover cables (as they are the same).

Note: You may notice the status lights as orange. This is normal as the switch will still be booting up or learning what hosts are connected to it.
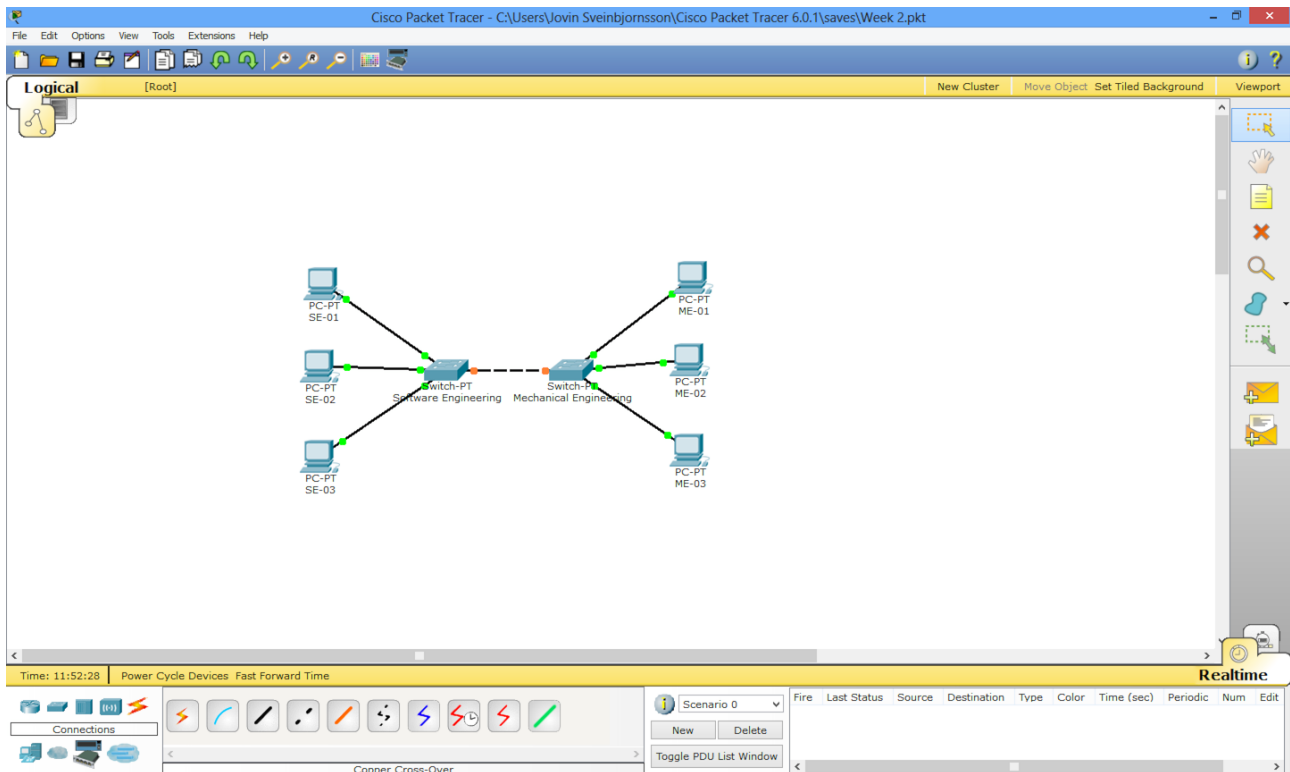
6. Now we need to start configuring our switches. For the most part this is very simple, our network should just work right now. You can test this out using a Simple PDU just like last week; it should travel across your network normally. Here, we can also immediately see the benefit of a switch over a hub, try our two at the same time PDU exercise from last week, you'll notice it's much cleaner (no dropped packets for every computer) and they no longer collide! This is because the Switches work on Layer 2, ie, the Data Link Layer.

Looking at the type in the Simulation window you'll see a lot of activity going on called 'STP' and 'DTP', this is the switches ensuring they know exactly who is connected and when. This will be covered in much more depth later in the semester.

We're going to set up some 'house-keeping' measures on our switches. This is a good thing to do as you can set up Message of the Day Banners and much more. Today, we'll learn how to do both of these. Go to the next page to learn this.

At any time you can always type a ? and press TAB to learn and complete your commands correctly. Make use of this extensively as it teaches you exactly what you need to type.

7. Click on one of your new switches, in it's configuration window click on the 'CLI' tab, this means 'command line interface' and it will be where we will be setting up all our network devices.

8. To get started, press the Enter (Return) key and you should see the below prompt:
```
Switch>
```

9. To start using commands at an admin level, type in the command `enable` and then press enter. Then we need to configure the terminal, so type in `configure terminal`

You should see the below on your CLI:
```
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#
```

Note: the # means we are in admin level, the (config) means we are in configuration mode.

10. Let's give the switch a name first so it doesn't just say 'Switch#'. To do so put in the following:
```
Switch(config)# hostname NAME
```

Simply replace NAME with whatever you wish to name your switch, I named mine 'SESwitch' as there can't be any spaces in the name. You'll now notice that the lines change to say
```
SESwitch(config)#
```

11. Next most important thing to do is to setup the time, we need to make sure it's correct for accurate logging. Type in the following:
```
SESwitch(config)# clock timezone AWST 8 0
```

This means timezone <name> +8 hours +0 minutes from GMT.

12. Now let's add a Message of the Day. Enter the following:
```
SESwitch(config)# banner motd }
```

You should see it say:
```
Enter TEXT message.  End with the character '}'.
```

This can be multiple lines, and it knows you're finished when you enter the character you chose to delimit the message, here, we have used } as our finishing character. I'll make my message be:
```
Welcome to the Software Engineering Switch.
This is the switch for the Software Engineering Star Network.}
```

13. Now, lets exit right out of the system and have a look at our banner. Do this by typing exit and pressing enter, then exit again and press enter. This should take us back to the original screen saying 'Press RETURN to get started.' Press return and you'll see your Message of the Day.

Congratulations! You've configured a switch at a basic level! Now do the same for the other switch, naming and giving the message as appropriate.