

## Scaling Up: How to Grow the Topology of an Existing Experiment

<http://groups.geni.net/geni/wiki/GEC21Agenda/ScalingUp/Procedure>  
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# Scaling Up: How to Grow the Topology of an Existing Experiment



## 1. Design the Experiment

- a. In today's experiment you will use resources at the aggregate listed on the worksheet. If you don't have a worksheet use *Wisconsin InstaGENI*

## 2. Establish the Environment

### 2.1 Pre-work: Install geni-lib

1. Install the `geni-lib` tool using the [installation instructions](#) for your operating system.
2. Install `networkx` on your system.

```
pip install networkx
```

3. On mac and UNIX you may need to add `geni-lib` to your path:

```
export PYTHONPATH="/PATH/TO/geni-lib:$PYTHONPATH"
```

## 3. Obtain Resources

Now we will generate a topology and reserve it.

### 3.1 Generate RSpec based on existing smaller topology

- a. Download this [config file](#) to use with the `scaleup` tool distributed with `geni-lib`.
- b. Open the file using your favorite text editor (e.g. `vi` or `emacs`).
- c. Replace each value of `x` with the value on your worksheet. Use search and replace in your text editor if possible. *If you are doing this outside a tutorial, replace `x` with `1`.*
- d. Run the `scaleup` script on the configuration file.
  - o On Mac and UNIX-like systems run:

```
cd /to/your/geni-lib
tools/scaleup/rspec_gen.py -r site.txt
```

- o On Windows:

```
cd C:\\Development\\geni-lib
tools\\scaleup\\rspec_gen.py -r site.txt
```

- e. Look at the generated file using your favorite tool (`less`, `more`, `emacs`, `vi`).
  - i. Can you find each node? Can you find the router node? The host nodes?
- f. Load the RSpec in your favorite tool (e.g. `Jacks`, `jFed`). Find the shared VLAN (it usually

looks like a link with only one end point).

- i. Change the IP address of the shared VLAN as directed on your worksheet.
- g. Bind the topology to the aggregate listed on your worksheet.
- h. **Save this RSpec.** In a real experiment, if this topology works, you would save the RSpec in version control.

### 3.3 Reserve Topology

- a. Create a slice and reserve the resources
  - b. Wait for the topology to come up.
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## Next: Execute

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### 4. Configure and Initialize

Now that you have reserved your resources, you are ready to test network connectivity.

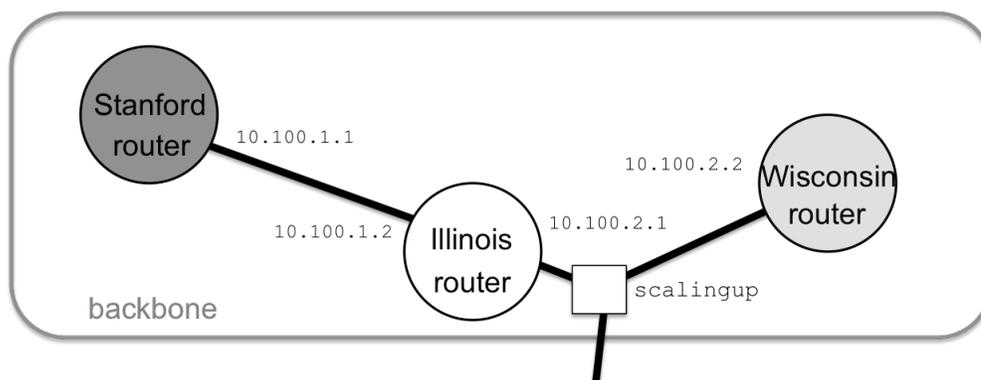
#### 4.1 Login to nodes

- Log into one of the host nodes (e.g. host-1) using `ssh`.

### 5. Execute Experiment

#### 5.1 Test connectivity

Verify the IP connectivity between the nodes.



- Ping various nodes shown in the picture.

```
ping 10.100.1.1
ping 10.100.2.2
```

### 6. Analyze Experiment

Now is when you would ordinarily analyze the results of your experiment.

#### 6.1 Logout of your nodes

- Then type `exit` in your open terminal.

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### 7. Teardown Experiment



When you are done with your experiment it is always good to clean up and release your resources so other people can use them.

### 8. Archive Experiment

- If your experiment worked, save your `site.txt` and `site-x.xml` files in version control.

#### NEXT! Grow Your Experiment!

Now that you have successfully reserved a small topology, you can now grow your topology.

- Make a copy of `site.txt`.

```
cp site.txt bigsite.txt
```

- Edit `bigsite.txt` to have more nodes in the core star topology.

```
num_nodes = 5
```

- Also change the nodes listed under `[host]` to include all of nodes 2-6.

```
node_list=2,3,4,5,6
```

- Change the name of the output file (replace `x` with the value from your worksheet) to:

```
output_rspec=bigsite-X.xml
```

- Go back to the [Design/Setup](#) and repeat everything from [Step 3.1.d](#) onward.
- How would you go about making a topology besides a star? What if you wanted to install different software on one of the nodes?



Look at the `geni-lib/tools/scaleup/readme.txt` and the files in `geni-lib/tools/scaleup/sample_configuration` for clues.

- View (but do not reserve) a few RSpecs. The [Jacks standalone editor](#) is good for this.