OACIS Hands-on(session1)

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OACIS Hands-on
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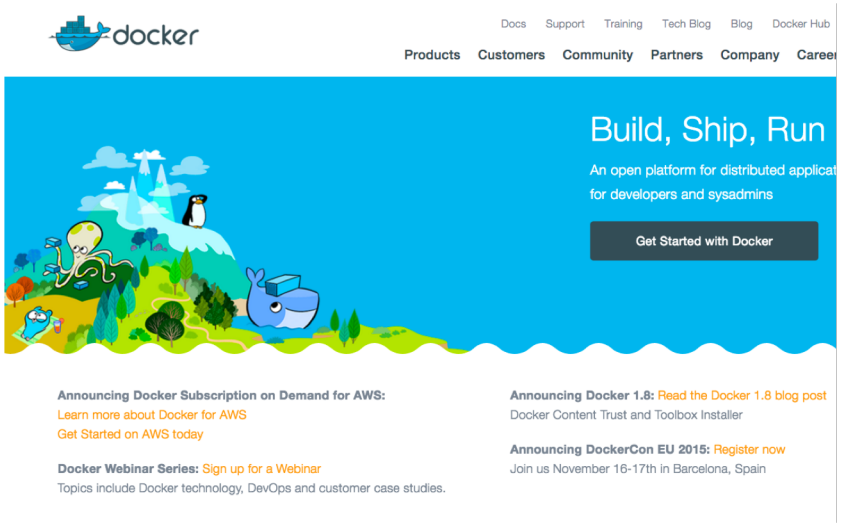
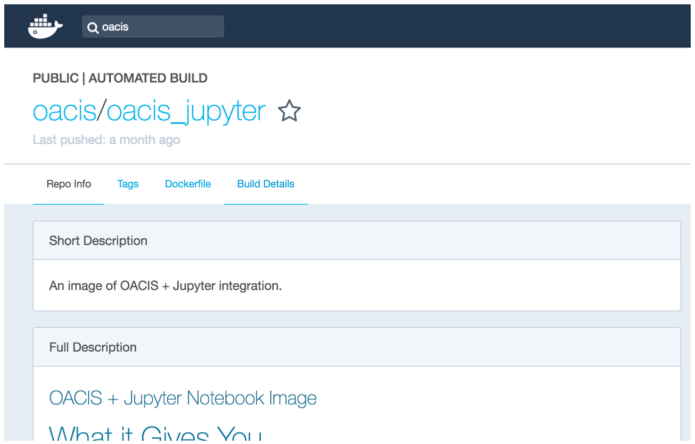
Hands-on 1: How to submit jobs

Virtual Machine used in this tutorial

- A Virtual Machine on Docker.
  - Docker is a software to manage virtual machines.
  - We distribute an image on which OACIS is pre-installed.



https://www.docker.com/



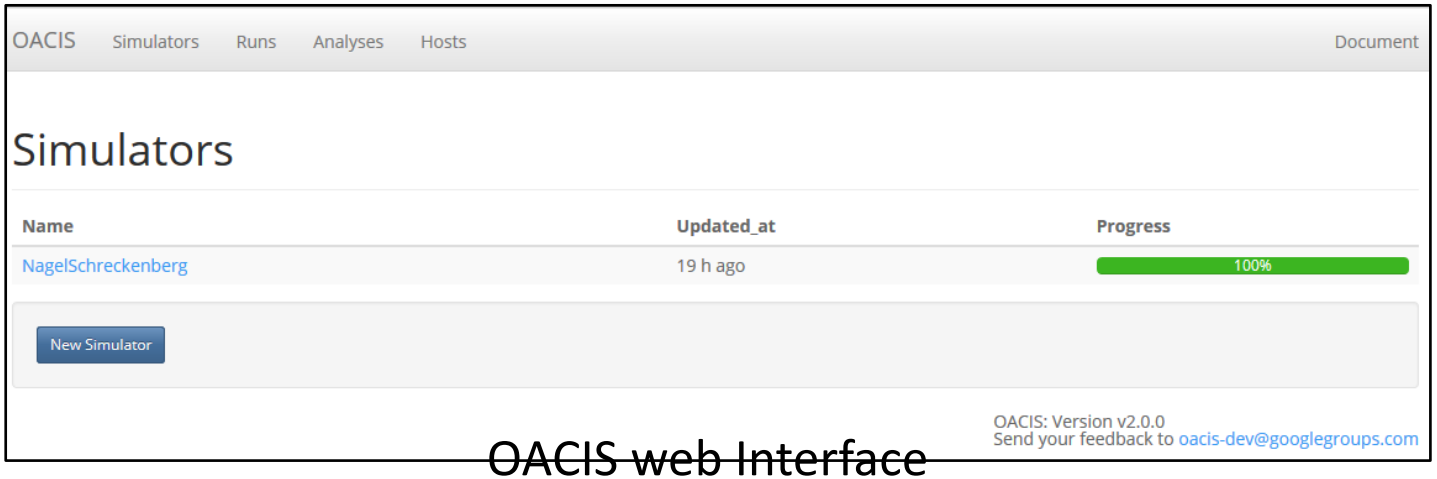
https://hub.docker.com/r/oacis/oacis_jupyter/

Launching OACIS

- Launch OACIS

```
docker run --name my_oacis -p 127.0.0.1:3000:3000 -p 127.0.0.1:8888:8888 -dt
oacis/oacis_jupyter
(for Docker toolbox users) docker run --name my_oacis -p 3000:3000 -p 8888:8888 -dt
oacis/oacis_jupyter
docker logs -f my_oacis   # wait until boot is ready. It may take 20-30 secs.
```

- Access OACIS web interface
  - http://localhost:3000
  - http://192.168.99.100:3000 (Docker toolbox)



OACIS web Interface

- You'll see an empty list of simulators.

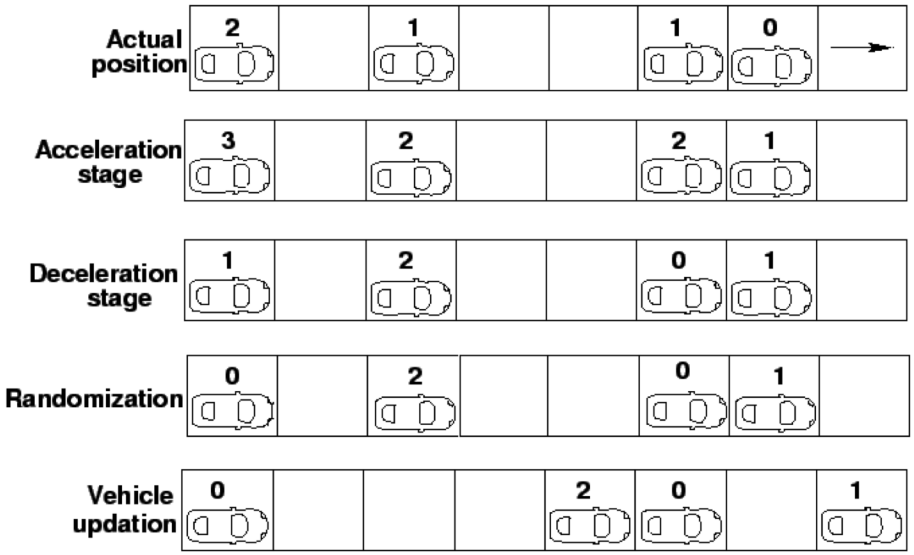
- To conduct simulations, we need to register a simulator on OACIS.
  - Run the following command to register a sample simulator used in this tutorial.

```
docker exec -it -u oacis my_oacis bash -l
( in the container)
git clone https://github.com/yohm/sim_ns_model.git
sim_ns_model/install_on_oacis.sh
```

  - We will learn how to register our simulators in the next session.

Nagel-Schreckenberg model

- Nagel-Schreckenberg is a cellular-automaton model for traffic congestion, proposed in 1990s.
- Refer to [Wikipedia](https://en.wikipedia.org/wiki/Nagel%E2%80%93Schreckenberg_model)

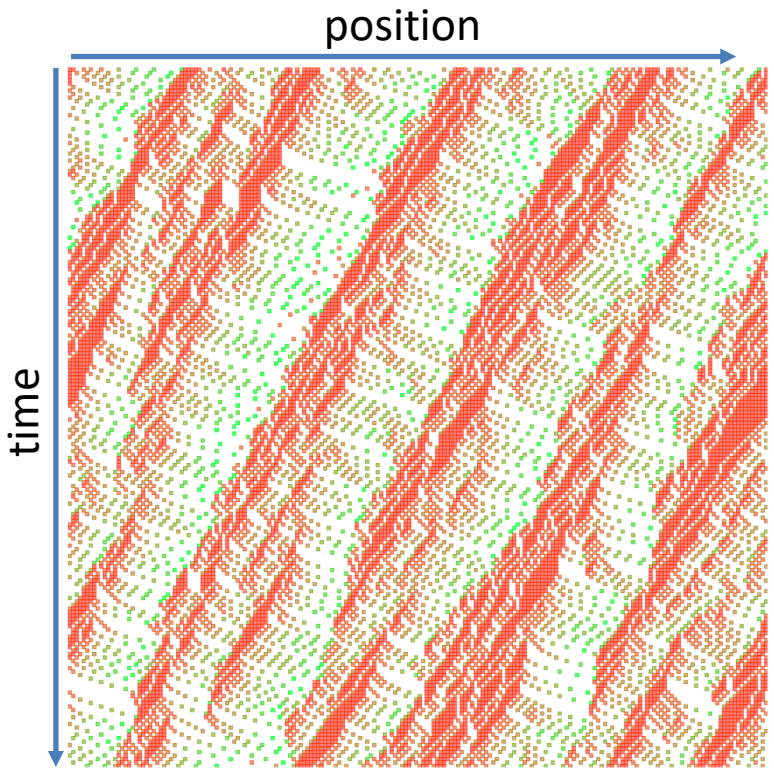


http://www.civil.iitb.ac.in/tvm/1111_nptel/544_TrCA/plain/plain.html

Key	Description
l	Road length
v	Maximum velocity
rho	Car density
p	deceleration probability
t_init	thermalization steps
t_measure	measurement steps

- It reproduces the phase transition between the free-flow phase and the congestion phase.

- Source code of this simulator
  - https://github.com/yohm/sim_ns_model
  - Output files of this simulator
    - a JSON file containing average velocity and flow
    - a snapshot PNG file.

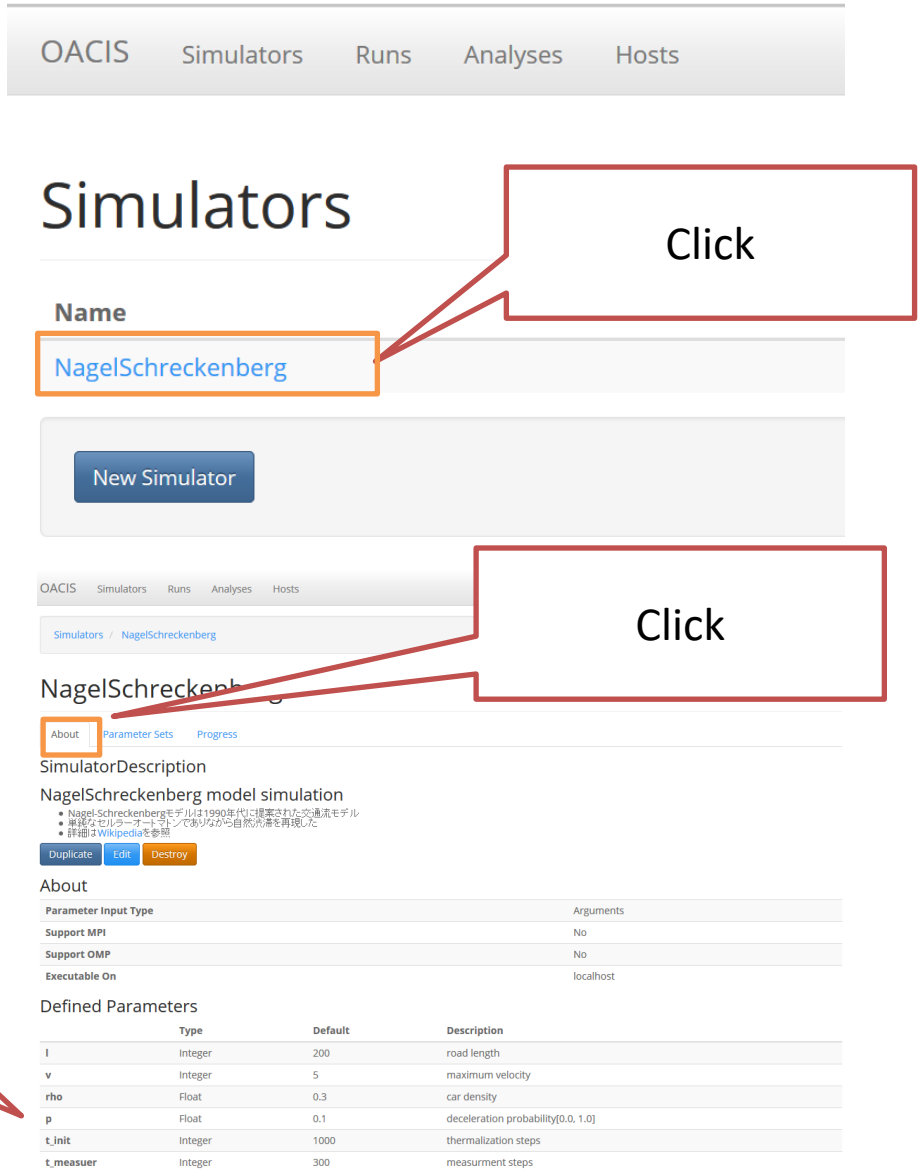


Selecting a Simulator

- Select a Simulator

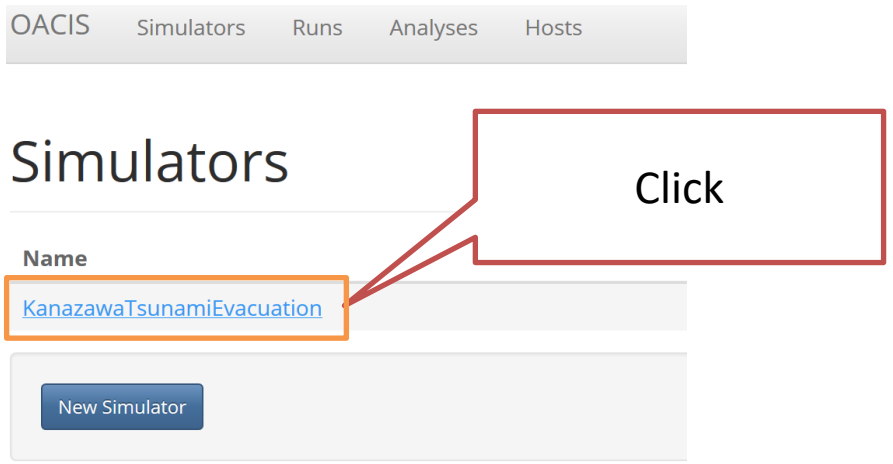
- Check Simulator settings

Definition of input parameters & configurations of the simulator are registered.

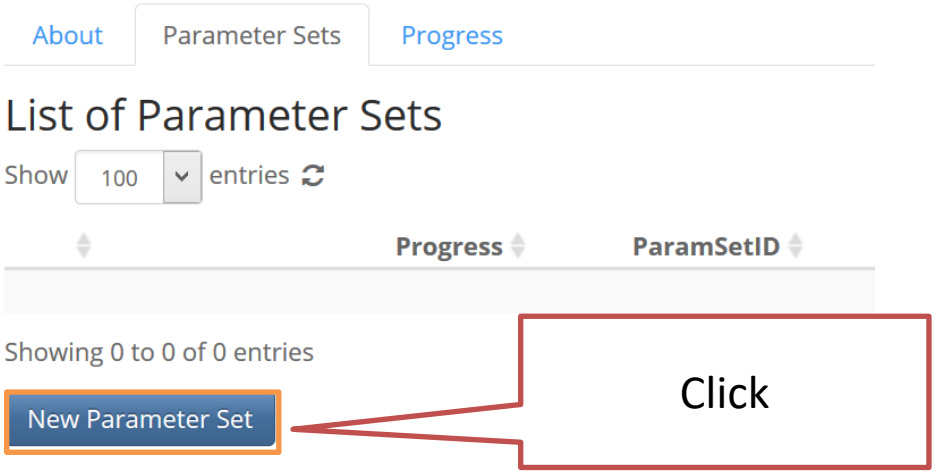


Creating a PS and Run

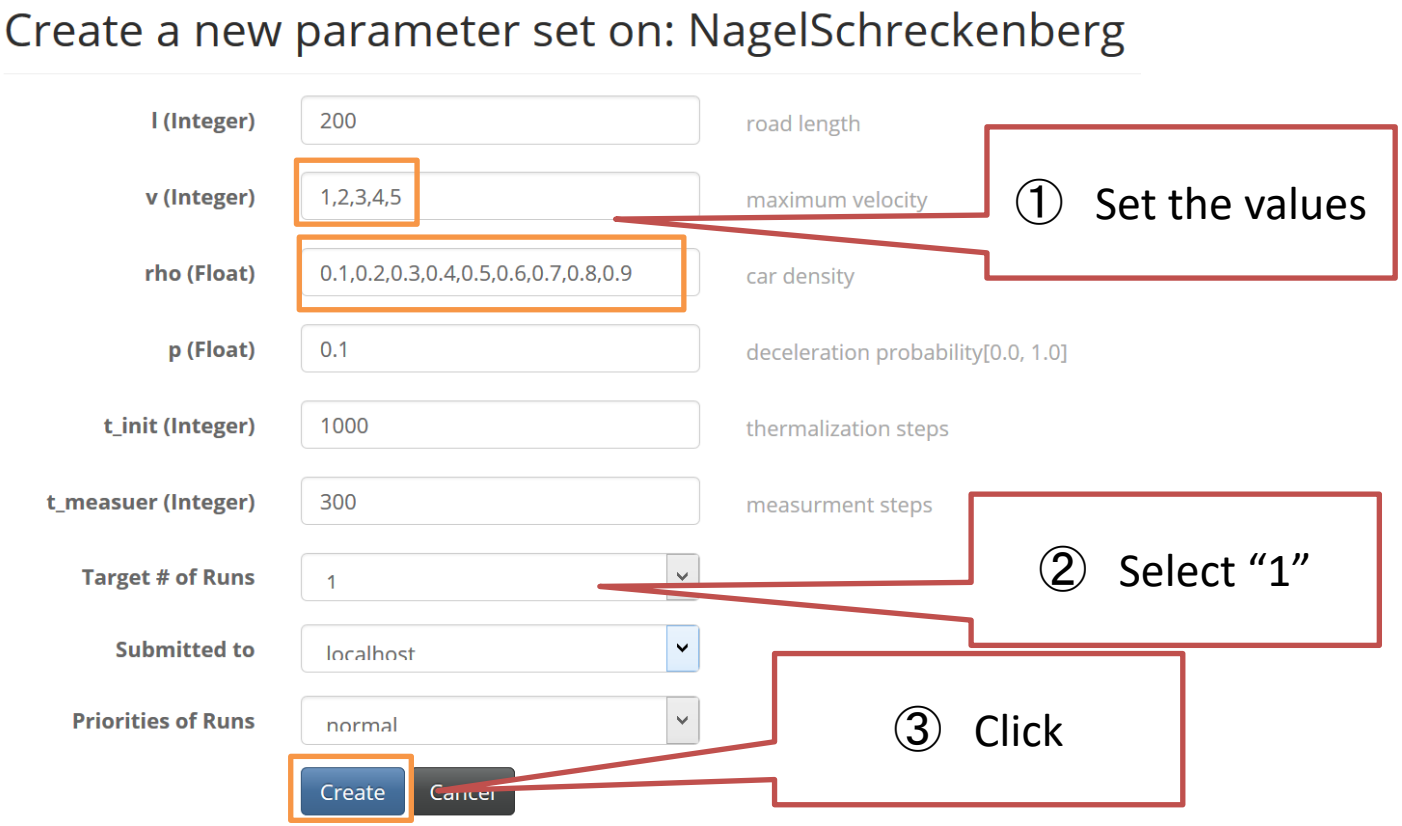
- Select a Simulator



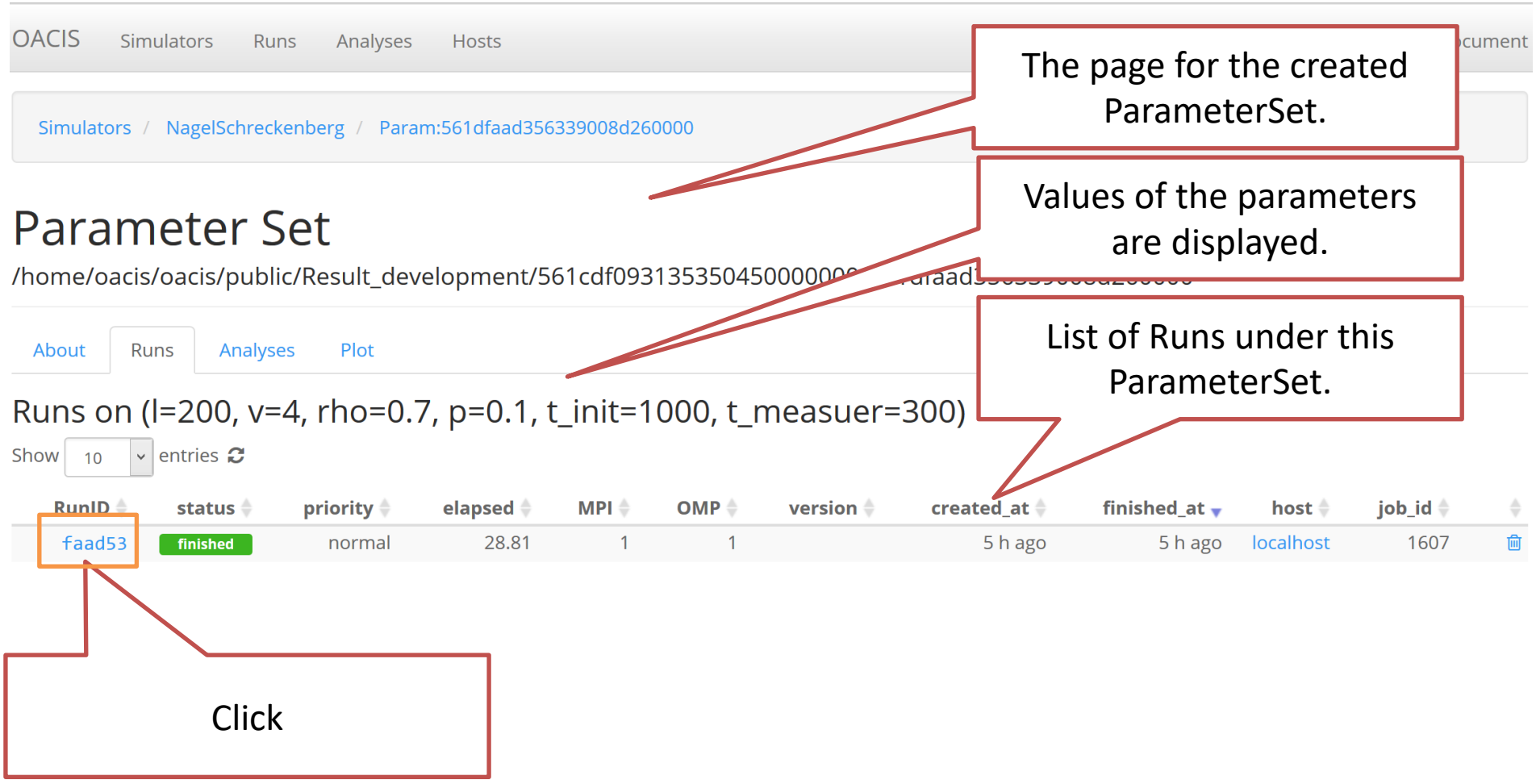
- List of ParameterSets are shown.
- Click “New ParameterSet” button to create a new PS.



- Creating a ParameterSet and Runs
  - Fill in the values of parameters
    - v = 5
    - rho = 0.2
  - Set “Target # of Runs” to `1`
  - Click “Create” button



- A new ParameterSet and a Run are created.
  - The status of the Run will change in a few seconds.



checking the results

OACIS Simulators Runs Analyses Hosts Document

Simulators / NagelSchreckenberg / Param:561dfaad356339008d260000 / Run:561dfaad356339008d530000

Run

(l=200, v=4, rho=0.7, p=0.1, t_init=1000, t_measuer=300)

/home/oacis/oacis/public/Result_development/561cdf09313535045000000/561dfaad356339008d260000/561dfaad356339008d530000

About | Results and Analyses

Results

velocity	0.25828333333333336
flow	0.18079833333333317

Output Files

/Result_development/561cdf09313535045000000/561dfaad356339008d260000/561dfaad356339008d530000/

- 561dfaad356339008d530000_xsub.sh
- _output.json
- _status.json
- _stderr.txt
- _stdout.txt
- _time.txt
- initial_time_series.dat
- traffic.png

Download Archive

The page of Run

Contents of "_output.json" file is saved in OACIS DB.

List of output files. Click it to access.

Figures (bmp,jpg,png…) are displayed inline.

A button to download the archive of these results.

OACIS Simulators Runs Analyses Hosts Document

Simulators / NagelSchreckenberg / Param:561dfaad356339008d260000 / Run:561dfaad356339008d530000

Run

(l=200, v=4, rho=0.7, p=0.1, t_init=1000, t_measuer=300)

/home/oacis/oacis/public/Result_development/561cdf093135350450000000/561dfaad356339008d260000/561dfaad356339008d530000

Path in the file system.

About | Results and Analyses

Results

velocity	0.25828333333333336
flow	0.18079833333333317

Output Files

/Result_development/561cdf093135350450000000/561dfaad356339008d260000/561dfaad356339008d530000/

- 561dfaad356339008d530000_xsub.sh
- _output.json
- _status.json
- _stderr.txt
- _stdout.txt
- _time.txt
- initial_time_series.dat
- traffic.png

Download Archive

Each result has its own URL.

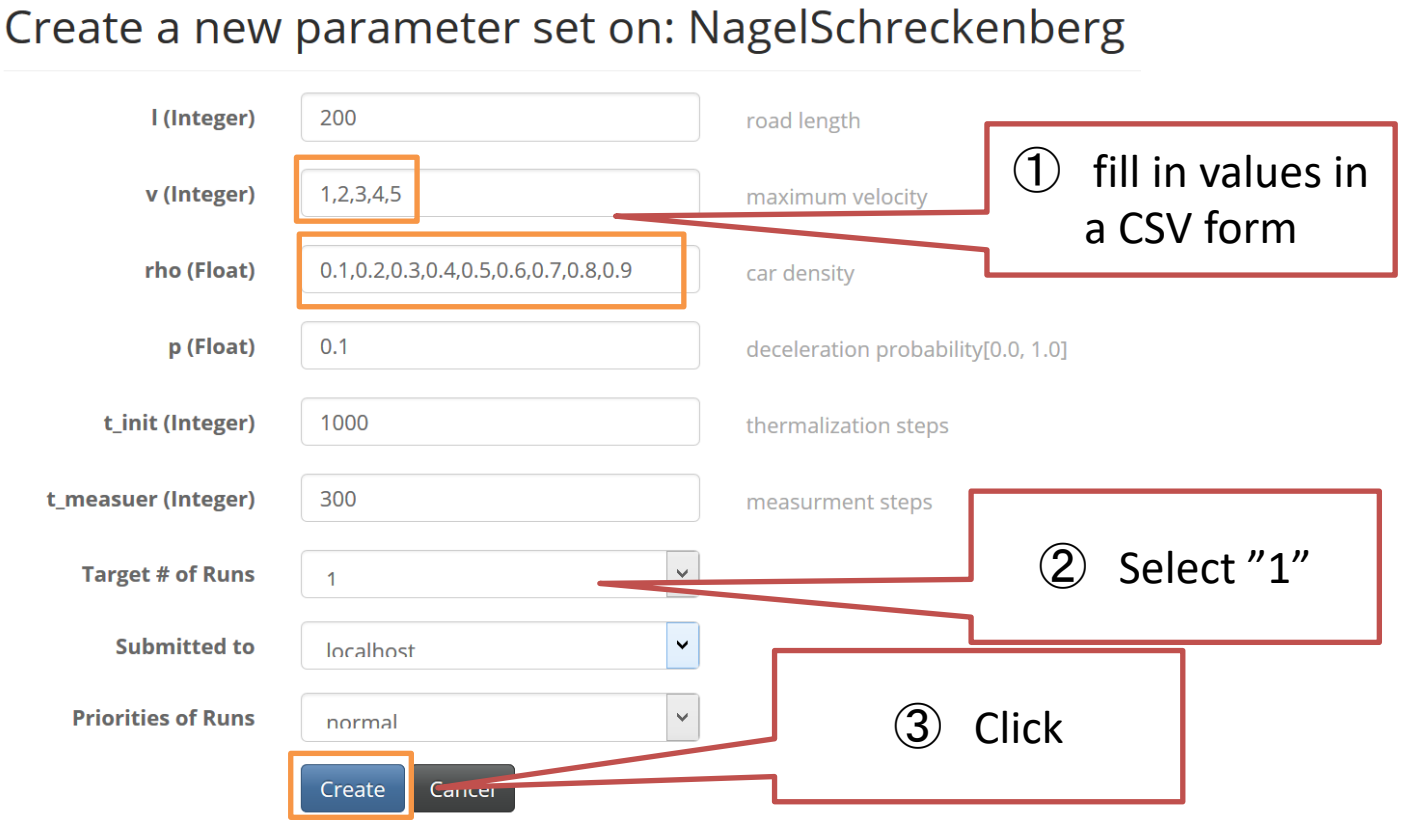
Ex. URL for this figure file:

http://192.168.99.100:3000/Result_development/561cdf093135350450000000/561dfaad356339008d260000/561dfaad356339008d530000/traffic.png

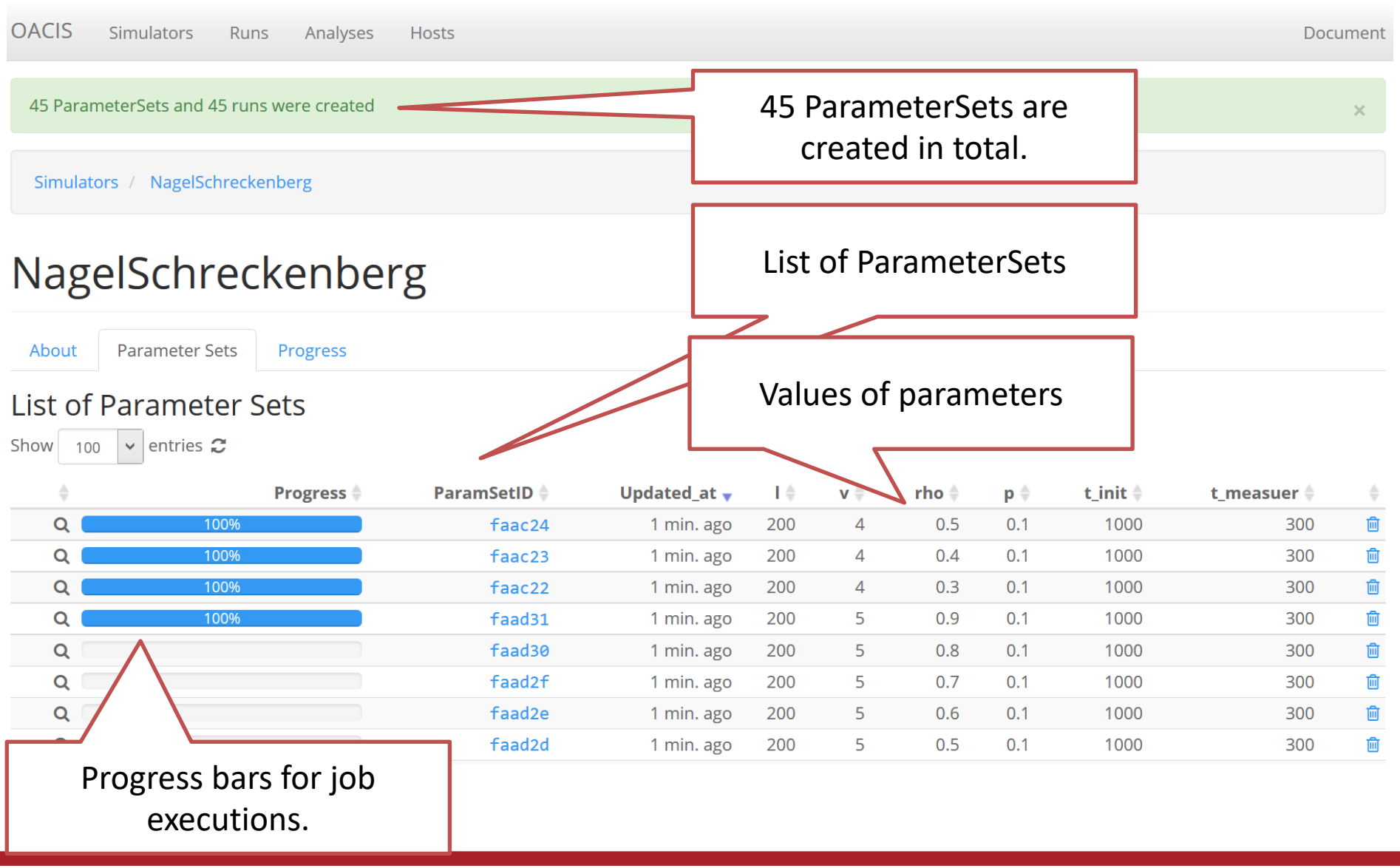
It is useful to summarize the results in your notebook by keeping this URL.

Making multiple jobs

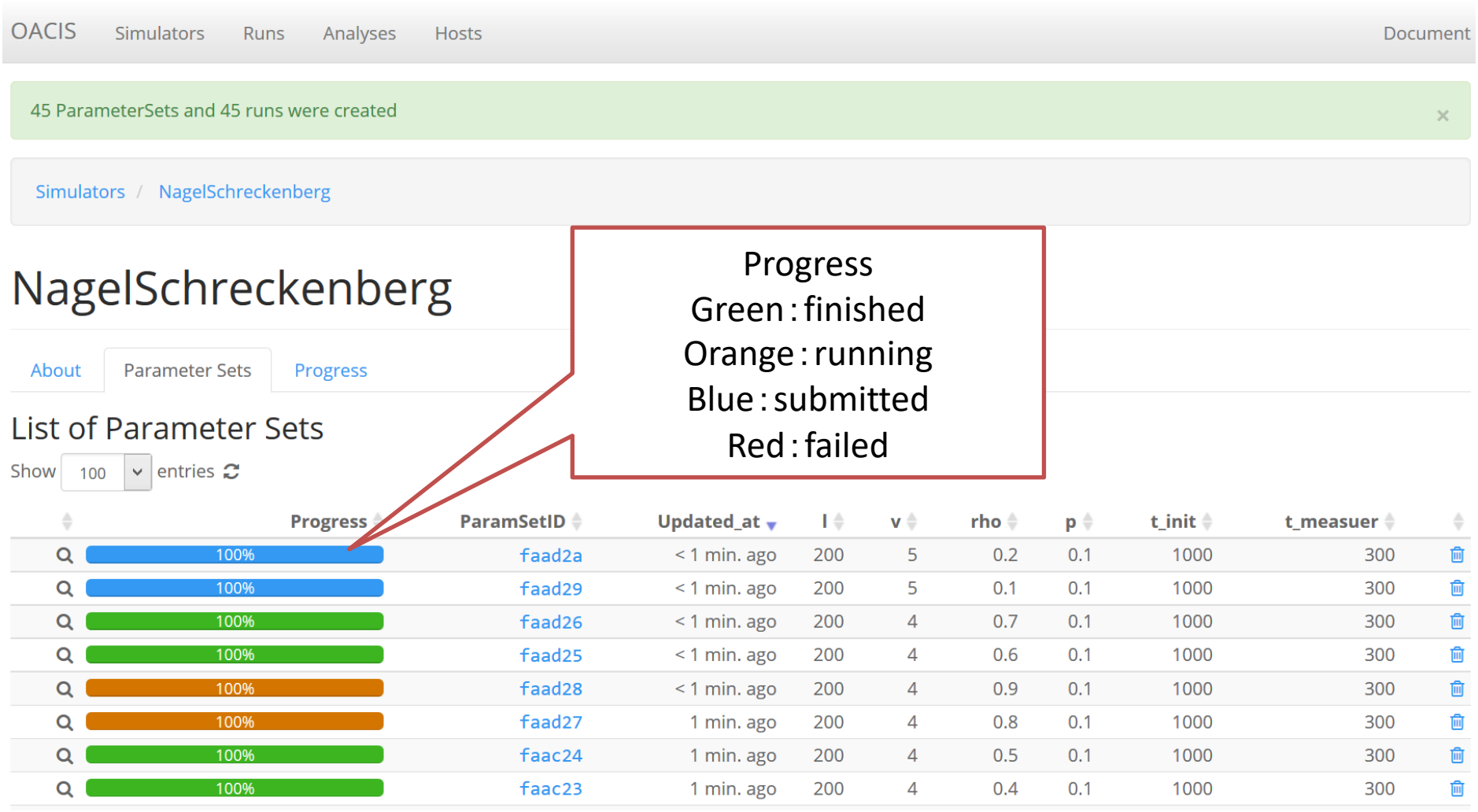
- In the form to create ParameterSets
  - fill in the values of parameters as comma-separated values
    - v = “1,2,3,4,5”
    - rho = “0.05,0.1,0.15,0.2,0.25,0.3,0.35,0.4,0.45,0.5”
  - Set “Target # of Runs” to `1`
  - Click Create



Making multiple jobs



Making multiple jobs



Progress	ParamSetID	Updated_at	l	v	rho	p	t_init	t_measuer
100%	faad2a	< 1 min. ago	200	5	0.2	0.1	1000	300
100%	faad29	< 1 min. ago	200	5	0.1	0.1	1000	300
100%	faad26	< 1 min. ago	200	4	0.7	0.1	1000	300
100%	faad25	< 1 min. ago	200	4	0.6	0.1	1000	300
100%	faad28	< 1 min. ago	200	4	0.9	0.1	1000	300
100%	faad27	1 min. ago	200	4	0.8	0.1	1000	300
100%	faac24	1 min. ago	200	4	0.5	0.1	1000	300
100%	faac23	1 min. ago	200	4	0.4	0.1	1000	300

Checking the results

OACIS Simulators Runs Analyses Hosts Document

45 ParameterSets and 45 runs were created ×

Simulators / NagelSchreckenberg

NagelSchreckenberg

About | Parameter Sets | Progress

List of Parameter Sets

Show 100 entries

Progress	ParamSetID	Updated_at			rho	p	t_init	t_measuer
100%	faad2a	< 1 min	200	5	0.2	0.1	1000	300
100%	faad29	1 min. ago	200	5	0.1	0.1	1000	300
100%	faad26	< 1 min. ago	200	4	0.7	0.1	1000	300
100%	faad25	< 1 min. ago	200	4	0.6	0.1	1000	300
100%	faad28	< 1 min. ago	200	4	0.9	0.1	1000	300
100%	faad27	1 min. ago	200	4	0.8	0.1	1000	300
100%	faac24	1 min. ago	200	4	0.5	0.1	1000	300
100%	faac23	1 min. ago	200	4	0.4	0.1	1000	300

Click
(ID may be different on your environment)


OACIS
Simulators
Runs
Analyses
Hosts
Document
Simulators / NagelSchreckenberg / Param:561dfaad356339008d260000
At the page of ParameterSet
Click “Plot”
Parameter Set
/home/oacis/oacis/public/Result_development/561cdf09313f5
50000000/561dfaad356339008d260000
About
Runs
Analyses
Plot
Runs on (l=200, v=4, rho=0.7, p=0.1, t_init=1000, t_measuer=300)
Show 10 entries
RunID status priority elapsed MPI OMP version created_at finished_at host job_id
faad53 finished normal 28.81 1 1 5 h ago 5 h ago localhost 1607

Parameter Set

/home/oacis/oacis/public/Result_development/5625a553393936008803000/5625a7c8343

About | Runs | Analyses | Plot

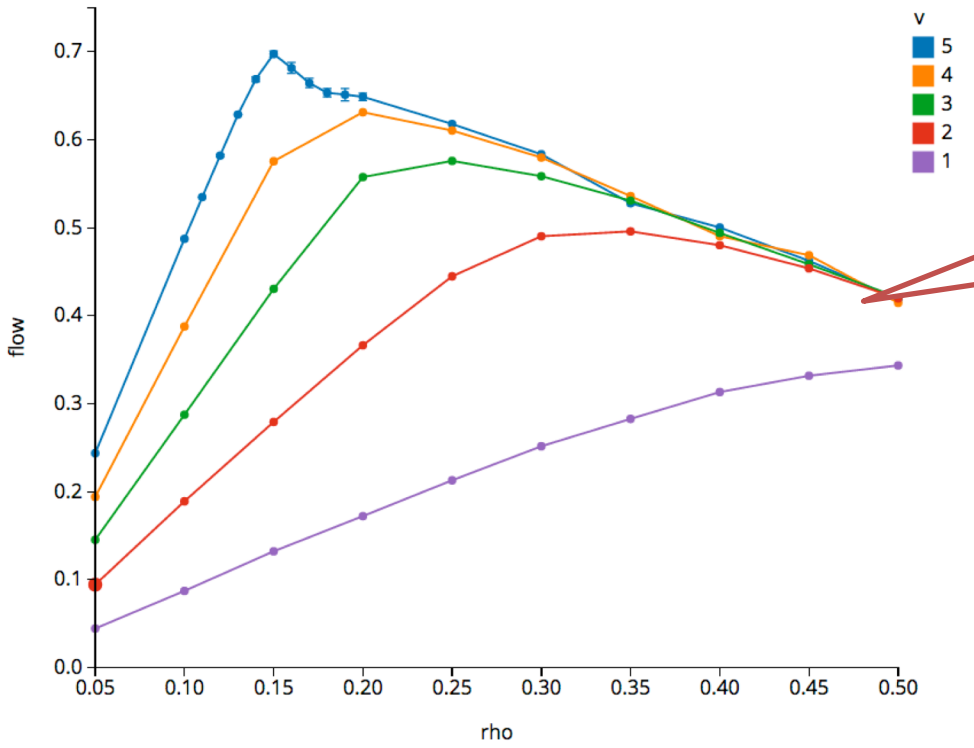
Plot on (l=200, v=2, rho=0.05, p=0.1, t_init=100, t_measure=300)

Plot type line plot

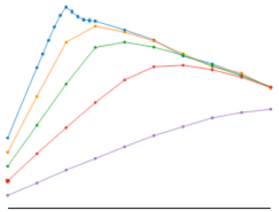
X-Axis rho **Y-Axis** .flow **Series** v **Add Line Plot**

Irrelevant parameters:

☐ l ☐ v ☐ rho ☐ p ☐ t_init ☐ t_measure



log scale on x axis
log scale on y axis



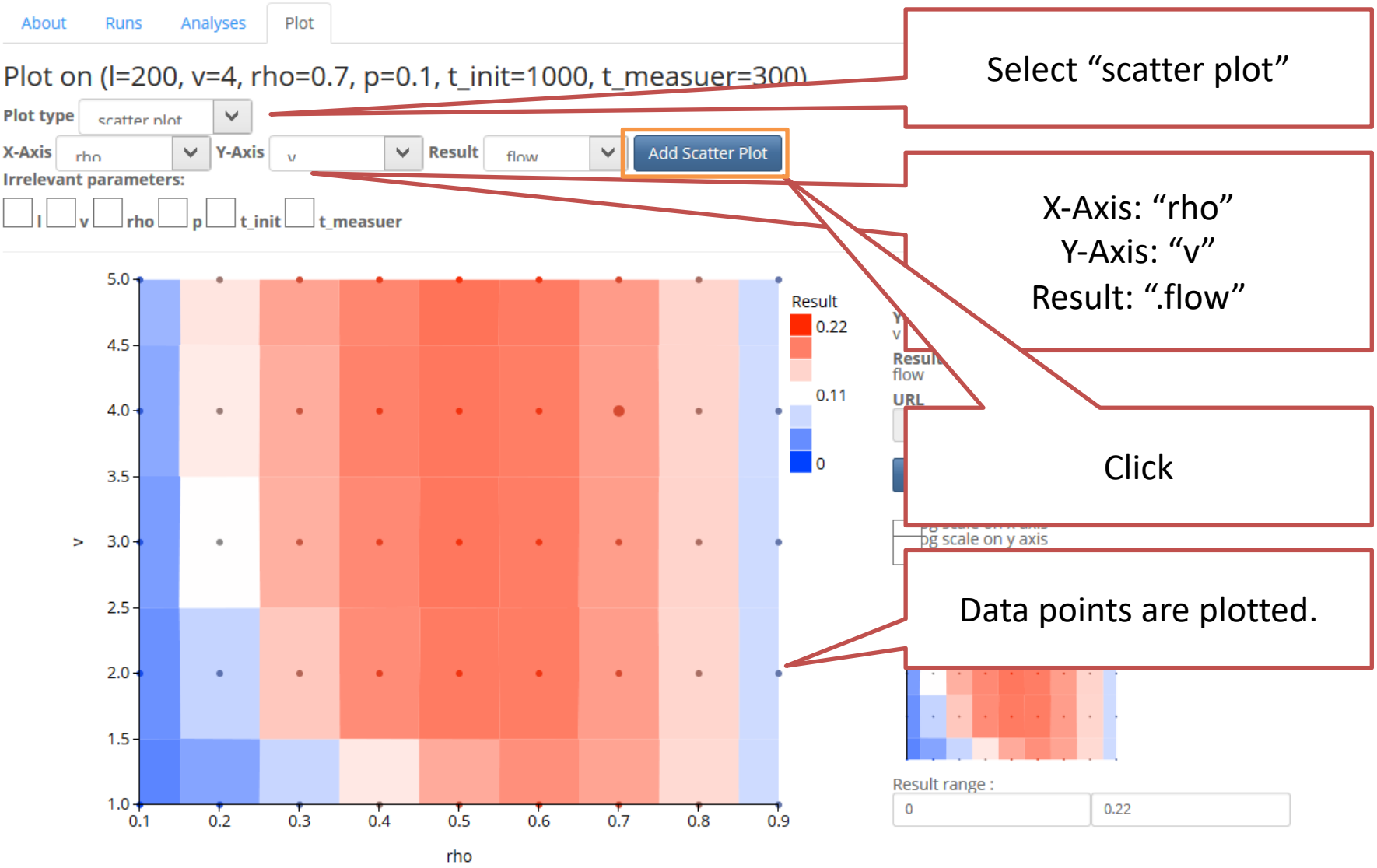
Select “line plot”

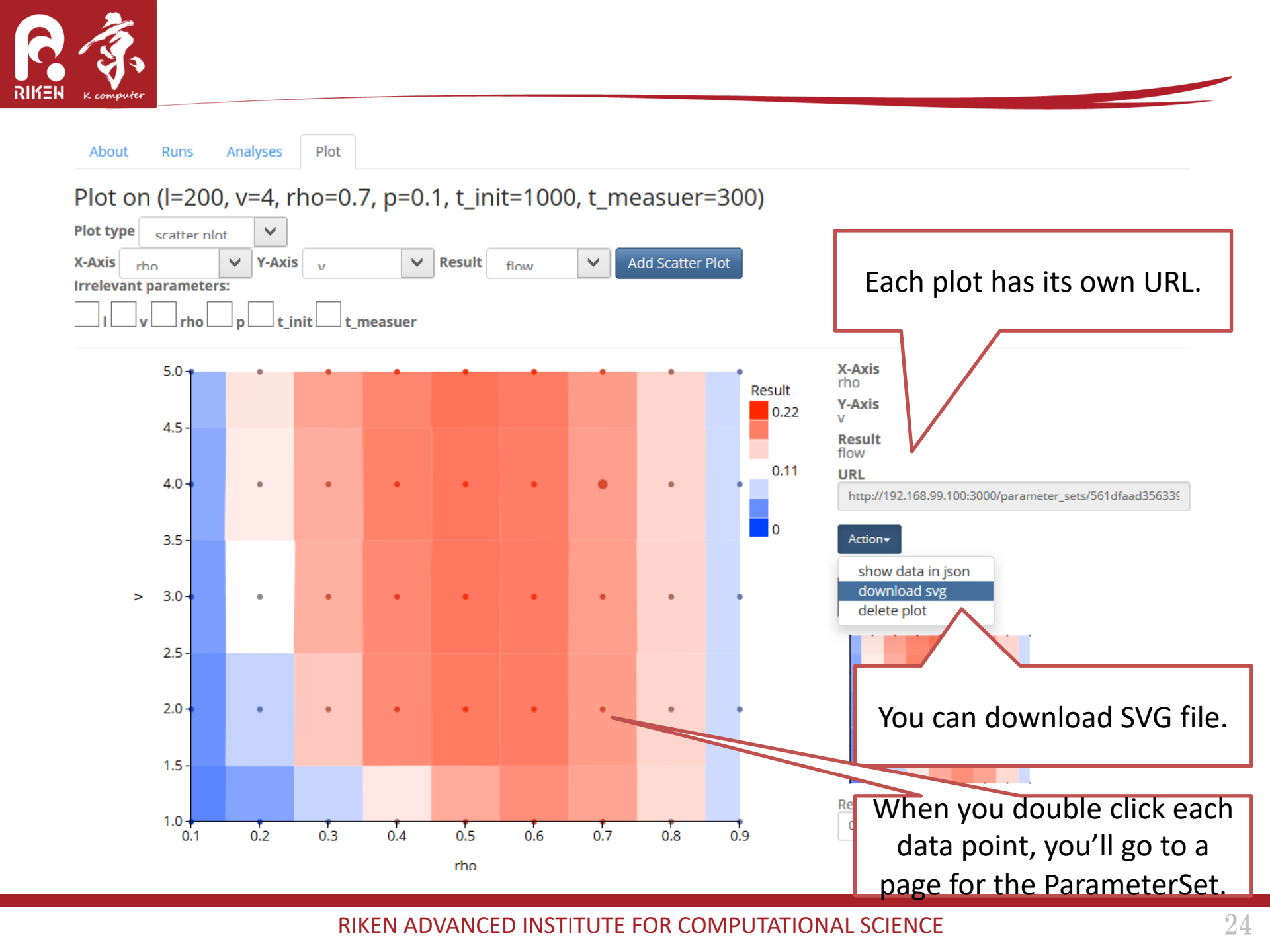
X-Axis: “rho”
Y-Axis: “flow”

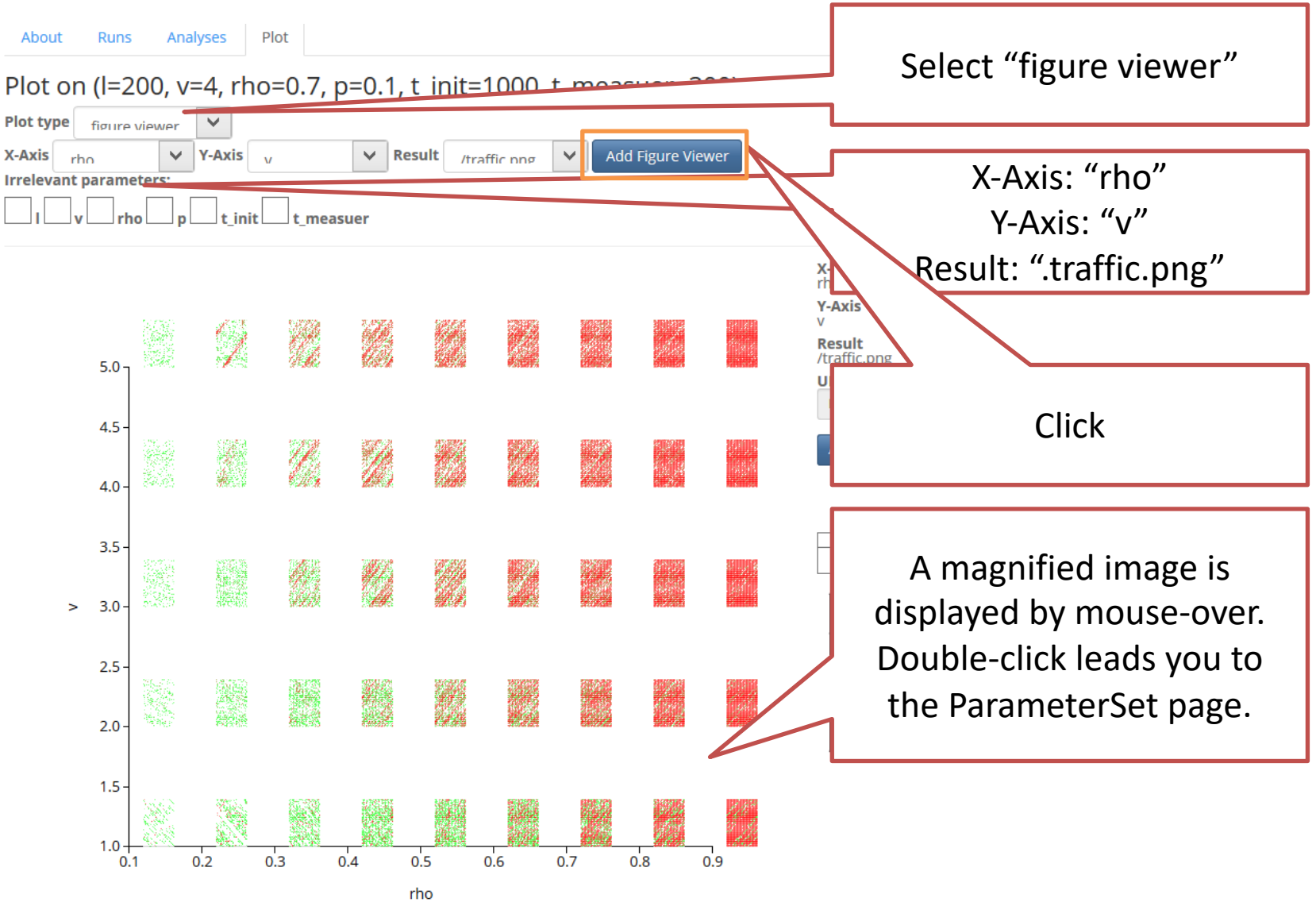
Click

Data saved in DB are plotted.

Checking the results




About
Runs
Analyses
Plot
Plot on (l=200, v=4, rho=0.7, p=0.1, t_init=1000, t_measuer=300)
Plot type
scatter plot
X-Axis
rho
Y-Axis
v
Result
flow
Add Scatter Plot
Irrelevant parameters:
l
v
rho
p
t_init
t_measuer
Result
0.22
0.11
0
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
v
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
rho
X-Axis
rho
Y-Axis
v
Result
flow
URL
http://192.168.99.100:3000/parameter_sets/561dfaad35633
Action
show data in json
download svg
delete plot
Each plot has its own URL.
You can download SVG file.
When you double click each data point, you'll go to a page for the ParameterSet.


About
Runs
Analyses
Plot
Plot on (l=200, v=4, rho=0.7, p=0.1, t_init=1000, t_measuer=200)
Plot type
figure viewer
X-Axis
rho
Y-Axis
v
Result
/traffic.png
Add Figure Viewer
Irrelevant parameters:
l
v
rho
p
t_init
t_measuer
Select “figure viewer”
X-Axis: “rho”
Y-Axis: “v”
Result: “.traffic.png”
Click
A magnified image is displayed by mouse-over. Double-click leads you to the ParameterSet page.
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
v
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
rho

If you have time…

- Open documentation page
  - There is a link on the upper-right corner.
- Run simulation with rho=0.0
  - The simulator will fail.
- Try other sample simulators.

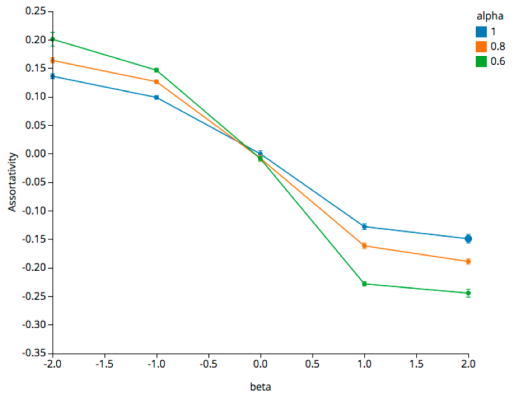
[optional] Another samples

- https://github.com/yohm/sim_power_mean_sampling
  - J. Torok, Y. Murase, H.-H. Jo et al., "What Big Data tells: Sampling the social network by communication channels", Phys. Rev. E (2016)

```
docker exec -it -u oacis my_oacis bash -l
(in the container)
git clone https://github.com/yohm/sim_power_mean_sampling.git
sim_power_mean_sampling/install.sh
```

Create ParameterSets with various alpha and beta for "NetworkSamplingTunedF0" simulator, and see how the assortativity of the sampled network depends on these parameters.

alpha = [0.6, 0.8, 1.0], beta = [-2.0, -1.0, 0.0, 1.0, 2.0]



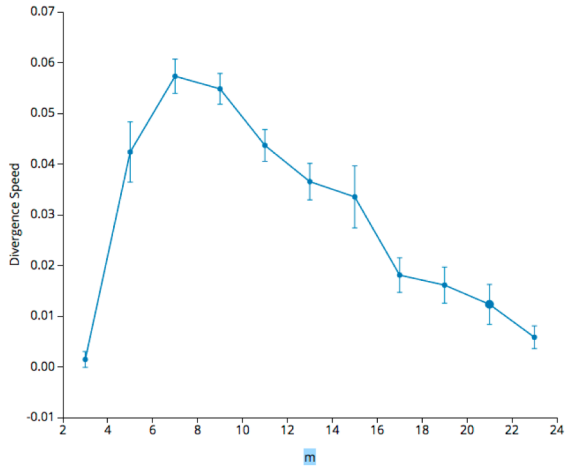
[optional]sample 2

courtesy of T. Shimada

- https://github.com/yohm/sim_eos_model
  - T. Shimada "A universal transition in the robustness of evolving open systems" Sci. Rep. 4: 4082 (2014).

```
docker exec -it -u oacis my_oacis bash -l
(in the container)
git clone https://github.com/yohm/sim_eos_model.git
sim_eos_model/install.sh
```

Run "EOS_model" simulator for m=[3,5,7,9,11,13,15,17,19,21,23],
and see that "Divergence Speed" is positive only for 5<= m <= 17.



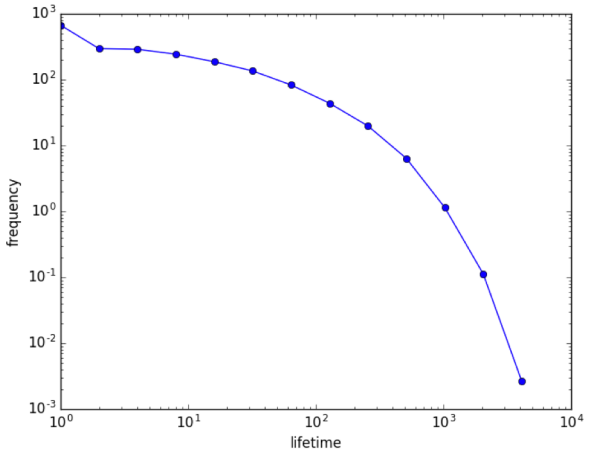
To see a clear transition,
set "t" to a much bigger value than the default value.

[optional] sample 3

- https://github.com/yohm/dynamical_graph_model
  - Y. Murase et al., "A simple model for skewed species-lifetime distributions", New J. Phys.(2010)

```
docker exec -it -u oacis my_oacis bash -l
(in the container)
git clone https://github.com/yohm/dynamical_graph_model.git
dynamical_graph_model/install.sh
```

Run "DynamicalGraphModel" simulator with the default parameters,
and see how the lifetime distribution looks like.



Stopping OACIS

- From the terminal
  - stopping OACIS

```
docker stop -t 60 my_oacis
```

==========

  - restarting OACIS

```
docker start my_oacis
```

  - logging in to the container

```
# user
docker exec -it -u oacis my_oacis bash -l
```

  - removing the container

```
docker stop my_oacis; docker rm -v my_oacis
```

Conclusion

- Installation of Docker and OACIS
- hands-on of simulation execution by OACIS
  - selecting the Simulator
  - creating ParameterSets and Runs
  - accessing the results
    - output files
    - plots

⇒ In the next hands-on
we will instruct how to implement YOUR simulator