# IPython Interactive Python shell

## CONCEPTS

Magics start with % (line) or %% (cell). With automagic on, the % may be left off.

**In[n]** your input
↓ runs
**Out[n]** result
↓ saved as
**_ __ ___** last 3 outputs

Install with pip install ipython and start it with ipython.

## HELP AND INSPECTION

**<obj>?**
Show docs for an object

**<obj>??**
Show source code too

**<obj>.<TAB>**
Complete attributes and methods

***<pattern>*?**
Search names by wildcard

**%<magic>?**
Docs for one magic

## RUNNING CODE

**%run** *<script.py> <args>*
Run a script in this session

**%load** *<file>*
Load code into the prompt

**%edit**
Compose input in your editor

**%paste**
Paste clipboard code as-is

**%cpaste**
Paste block, end with --

**%%writefile** *<file>*
Write the cell to a file

**%reset**
Clear all variables

## TIMING

**%time** *<stmt>*
Time one run

**%timeit** *<stmt>*
Time many runs, average

## TIMING (cont.)

**%%time**
Time the whole cell

**%%timeit**
Time a cell, with setup line

## HISTORY AND OUTPUT

**%history**
Show session input

**%history -n**
Include line numbers

**%history -g** *<text>*
Search all stored history

**%rerun**
Re-run the previous line

**In[***<n>***]**
Input of cell n

**Out[***<n>***]**
Output of cell n

**_ / __ / ___**
Last three outputs

## SHELL AND SYSTEM

**!***<command>*
Run a shell command

*<var>* **= !***<command>*
Capture output as a list

**!***<command>* **{***<pyvar>***}**
Insert a Python value

**%%bash**
Run the cell in bash

**%cd** *<dir>*
Change directory

**%pwd**
Print working directory

**%env** *<VAR>=<value>*
Set an env variable

**%pip install** *<pkg>*
Install into this environment

## DEBUGGING

**%debug**
Open pdb after an exception

**%pdb on**
Debug every uncaught error

## DEBUGGING (cont.)

**%xmode Verbose**
Richer tracebacks

**%tb**
Show last traceback again

## MODULES AND WORKSPACE

**%load_ext autoreload**
Enable the extension

**%autoreload 2**
Reload all before each run

**%autoreload 1**
Reload only %aimport modules

**%who**
List variable names

**%whos**
List variables with types

**%matplotlib inline**
Plot inside the frontend

## CONFIG AND SHORTCUTS

**ipython profile create**
Create default config files

**ipython --profile=***<name>*
Start with a profile

**ipython -i** *<script.py>*
Run, then stay interactive

### Keyboard

| Key | Does |
|---|---|
| Tab | Complete or cycle |
| Ctrl+R | Search history |
| Ctrl+O | Open new line |
| Esc Enter | Force run block |
| Ctrl+L | Clear screen |
| Ctrl+D | Exit |

Startup scripts: put .py or .ipy files in ~/.ipython/profile_default/startup/; they run in filename order.

## RECIPES

### Edit a module and keep going

```
%load_ext autoreload
%autoreload 2
import mymod
mymod.run()
# edit mymod.py, then call again
```