The Omni User

An Association of Chicagoland Computer Professionals

IBM Champion

5 Year Milestone

IBM

Introduction to Python for IBM i

MIKE PAVLAK

Profound Logic

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Today’s schedule

12:00 - Introduction to Python for RPGers (Mike)

1:30 - Python and Data Access (Mike)

3:00 - RPG Makes Friends with Open Source Apps (Richard)

4:30 - Python Modules for Profitability (Mike)

7:00 - Pass the Flask & Quickly Pour IBM I Python Web Apps & Services (Richard)

Agenda

A little about Python

Why use Python

How to install/determine if installed

- IDE

Syntax 101

- Variables
- Strings
- Functions

Database

Acknowledgements

Kevin Adler

Tony Cairns

Jesse Gorzinski

Google

Memegenerator

Corn chips and salsa

Parrots

And, of course, spam

"If I have seen further it is by **standing on the shoulders of Giants**." Bernard of Chartres circa 1159 AD

A little about Python

What is it, really?

General purpose language

Easy to get started

Simple syntax

Great for integrations (glue between systems)

Access to C and other APIs

Infrastructure first, but applications, too

Historically…

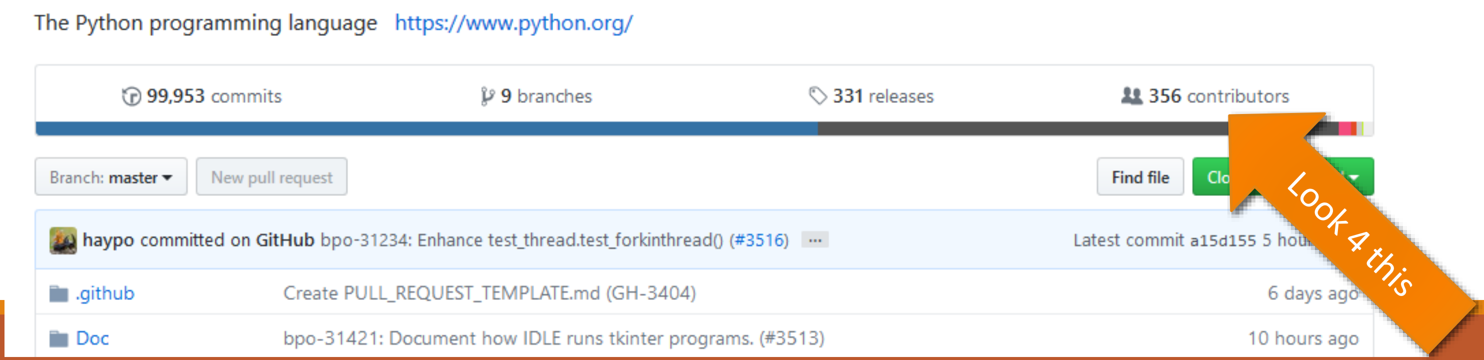
Python was conceptualized by Guido Van Rossum in the late 1980’s

Rossum published the first version of Python code (0.9.0) in February of 1991 at the CWI(Centrum Wiskunde & Informatica) in the Netherlands, Amsterdam

Python is derived from the ABC programming language, which is a general purpose language that was also developed at CWI.

Rossum chose the name “Python” since he was a fan of Monty Python’s Flying Circus.

Python is now maintained by a core development team at the institute, although Rossum still holds a vital role in directing its progress and as leading “commitor”.



The Python programming language https://www.python.org/

99,953 commits | 9 branches | 331 releases | 356 contributors

Branch: master ▾ | New pull request | Find file | Clo

haypo committed on GitHub bpo-31234: Enhance test_thread.test_forkinthread() (#3516) … Latest commit a15d155 5 hou

.github	Create PULL_REQUEST_TEMPLATE.md (GH-3404)	6 days ago
Doc	bpo-31421: Document how IDLE runs tkinter programs. (#3513)	10 hours ago

Look 4 this

Python lineage

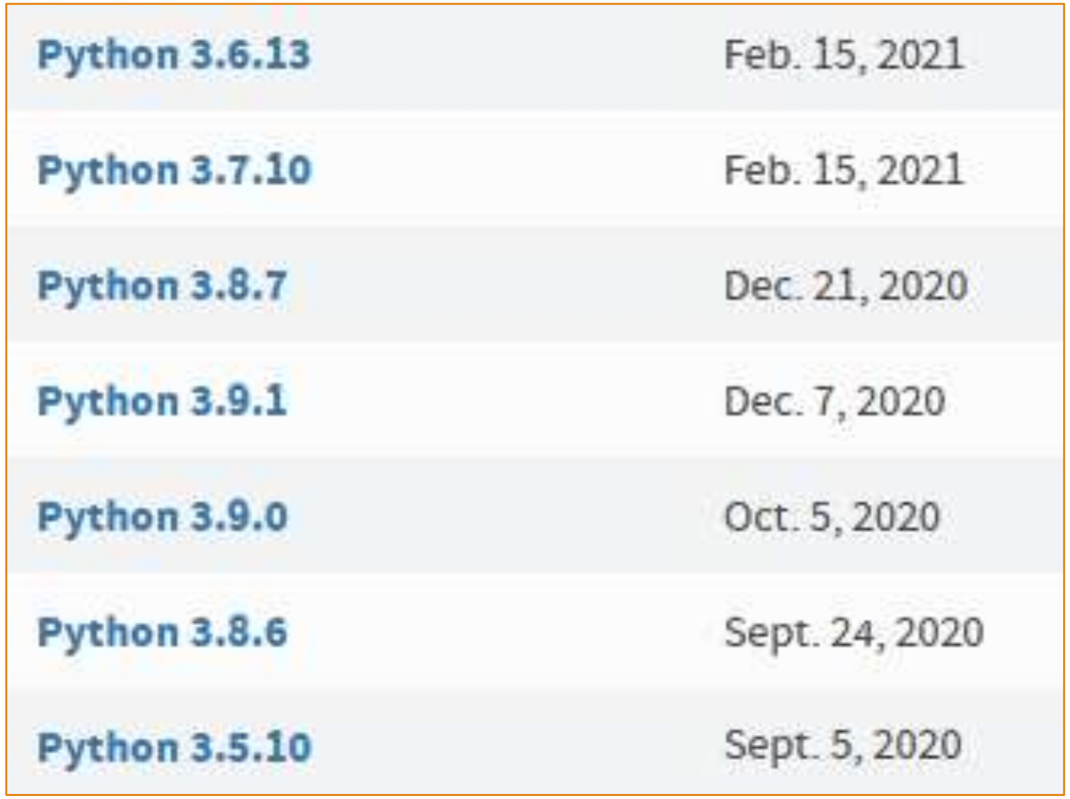
Python 1 – 1994

Python 2 – 2000 (Not dead yet…)

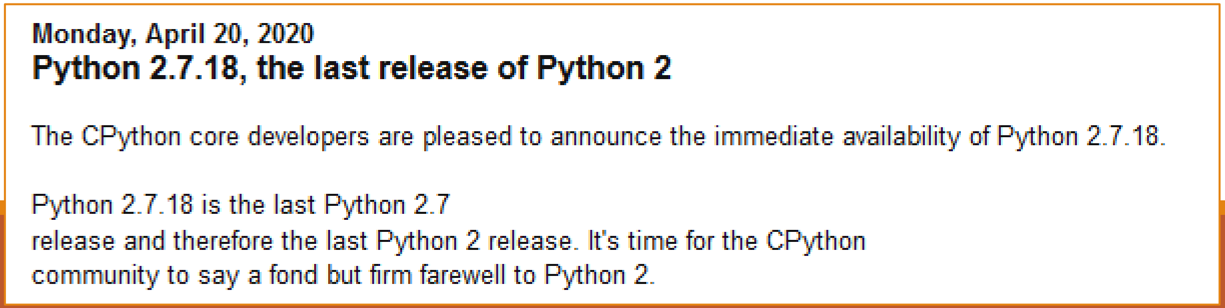
- 2.7 – 2010
- 2.7.17 – Oct 2019 **

Python 3 – 2008

- 3.5.10 – Sep 2020
- 3.6.13 – Feb 2021
- 3.7.10 – Feb 2021
- 3.8.7 – Dec 2020
- 3.9.1 – Dec 2020



Python 3.6.13	Feb. 15, 2021
Python 3.7.10	Feb. 15, 2021
Python 3.8.7	Dec. 21, 2020
Python 3.9.1	Dec. 7, 2020
Python 3.9.0	Oct. 5, 2020
Python 3.8.6	Sept. 24, 2020
Python 3.5.10	Sept. 5, 2020



Monday, April 20, 2020

Python 2.7.18, the last release of Python 2

The CPython core developers are pleased to announce the immediate availability of Python 2.7.18.

Python 2.7.18 is the last Python 2.7
release and therefore the last Python 2 release. It's time for the CPython
community to say a fond but firm farewell to Python 2.

What’s the diff of 2 vs. 3?

Example:

- Python 2 print statement replaced by function
  - Python 2 – print “Hello World!”
  - Python 3 – print(“Hello World!”)

Many more differences, tho…

Which one?

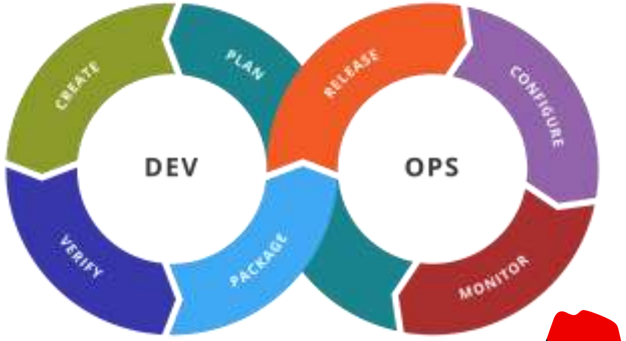
- Correct answer: It depends…
  - New Development ➔ Python 3
  - Some existing libraries are Python 2 but 90%+ are also Python 3 compliant, or on their way

Why Python?

Python is the “CL” of Open Source

Devops

- Build automation
- Configuration management
- Test automation
- Basic web apps without a web server
- Data visualizations
- Workflow automation



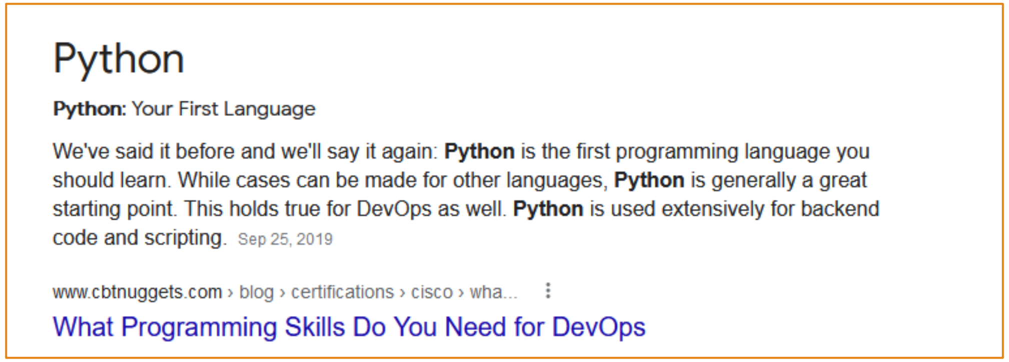
Red Hat
Ansible Automation
Platform

Ansible is written in Python

Its just there so people use it.

Just ask Google…

what is the language for devops?



Python

Python: Your First Language

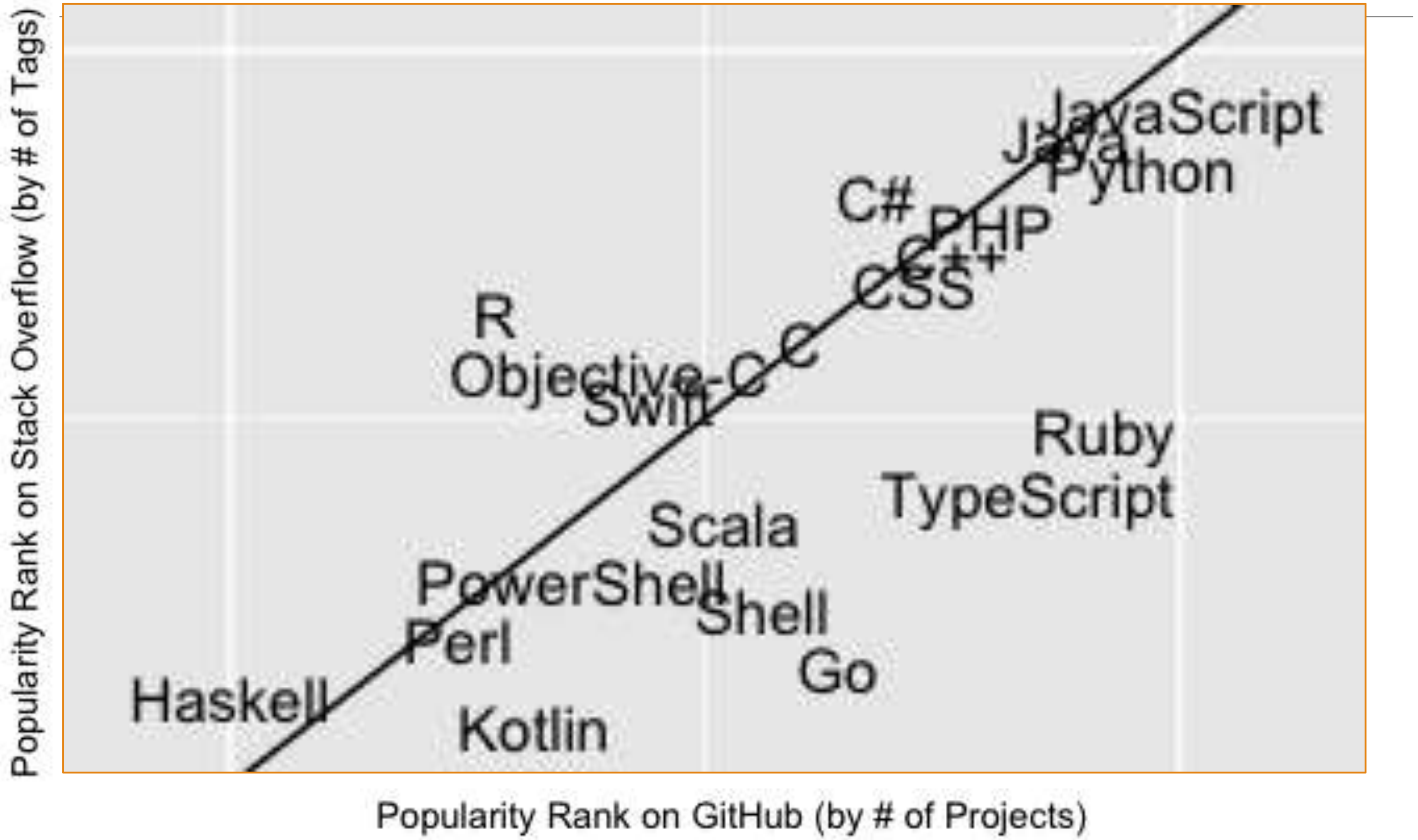
We've said it before and we'll say it again: **Python** is the first programming language you should learn. While cases can be made for other languages, **Python** is generally a great starting point. This holds true for DevOps as well. **Python** is used extensively for backend code and scripting. Sep 25, 2019

www.cbtnuggets.com › blog › certifications › cisco › wha...

What Programming Skills Do You Need for DevOps https://redmonk.com/sogrady/2020/07/27/language-rankings-6-20/

RedMonk

1	JavaScript
2	Python
3	Java
4	PHP
5	C++
5	C#
7	Ruby
7	CSS
9	TypeScript
10	C
11	Swift
11	Objective-C
13	R
14	Scala
15	Go
15	Shell
17	PowerShell
18	Perl
19	Kotlin
20	Rust



More available

In the Business Value of Python presentation

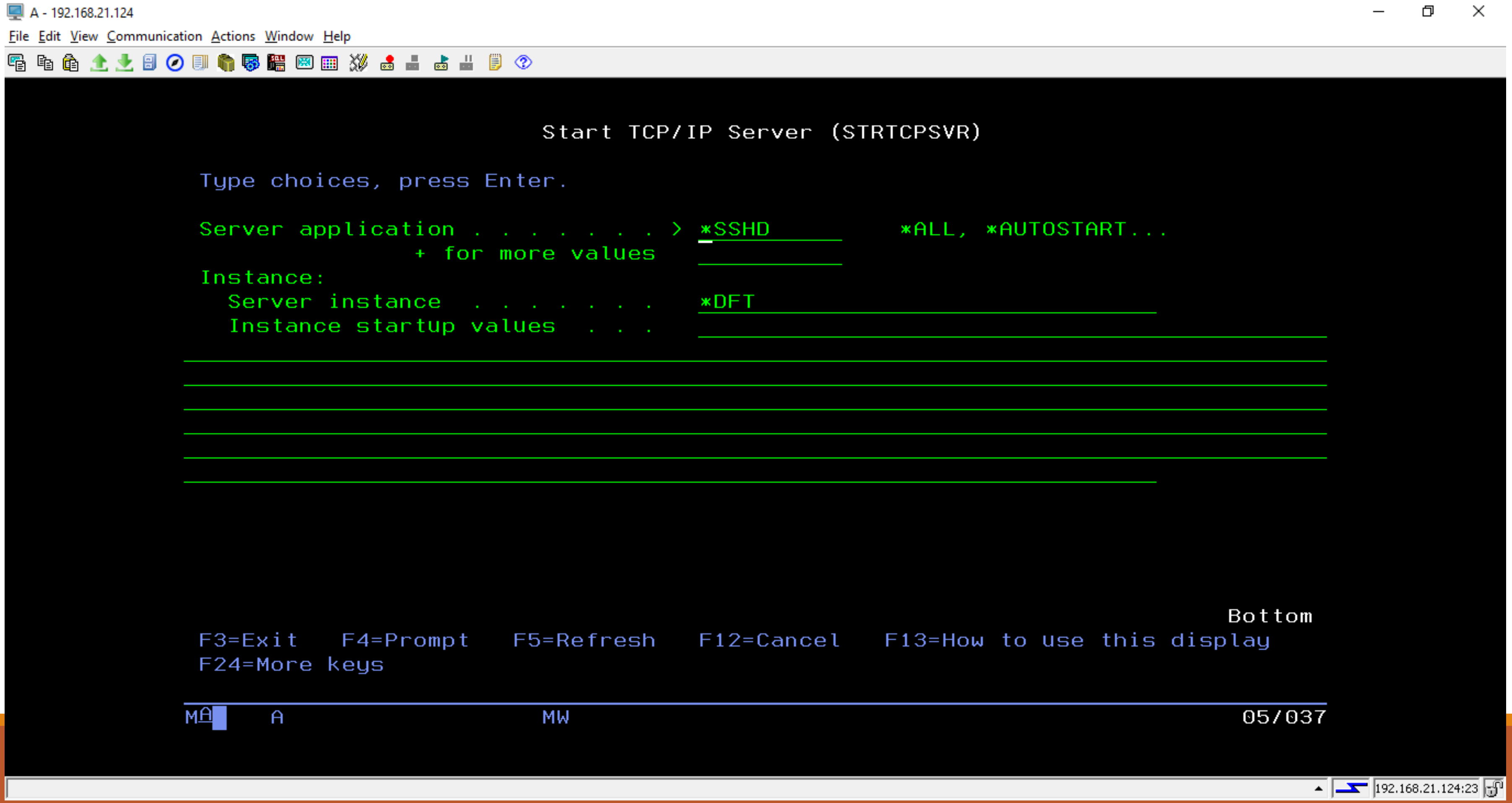
Or, send me an email and I’ll send you the slides

MikePavlak@gmail.com

Got Python?

Leverage RPM's   No more 5733-OPS

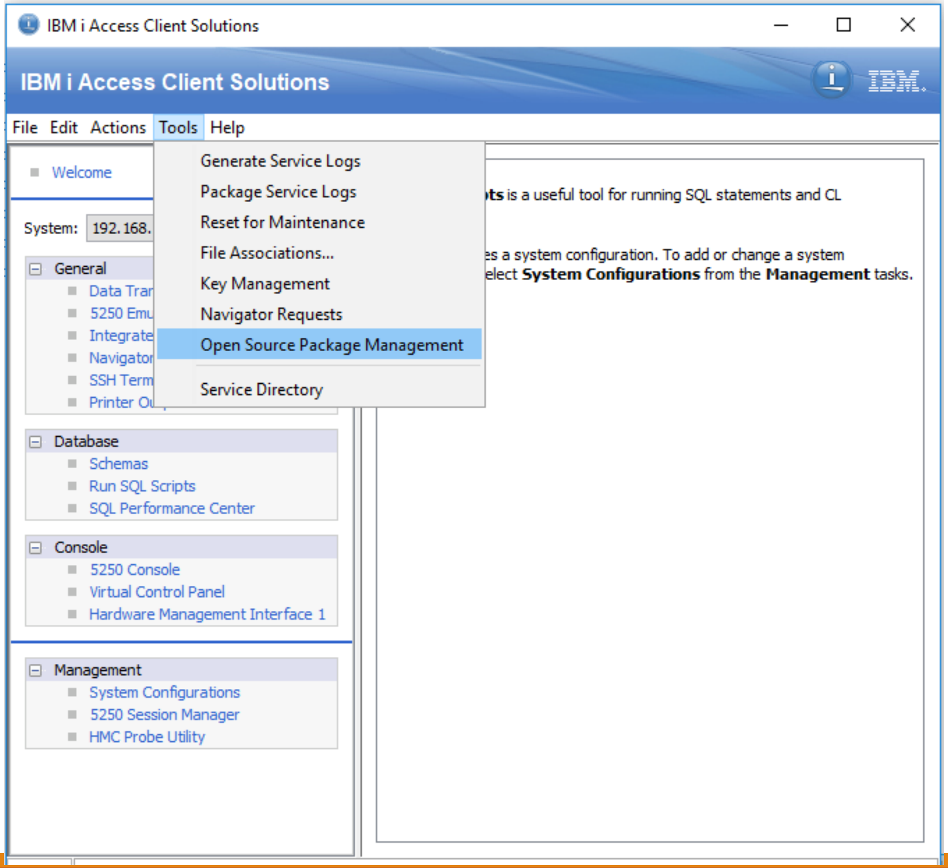
Use ACS to do the heavy lifting! But fire up SSH first.



```
                          Start TCP/IP Server (STRTCPSVR)

 Type choices, press Enter.

 Server application . . . . . . . > *SSHD          *ALL, *AUTOSTART...
               + for more values
 Instance:
   Server instance  . . . . . . .   *DFT
   Instance startup values  . . .







                                                                        Bottom
 F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
 F24=More keys

MA     A                  MW                                          05/037
```

ACS is home to the RPM goodness

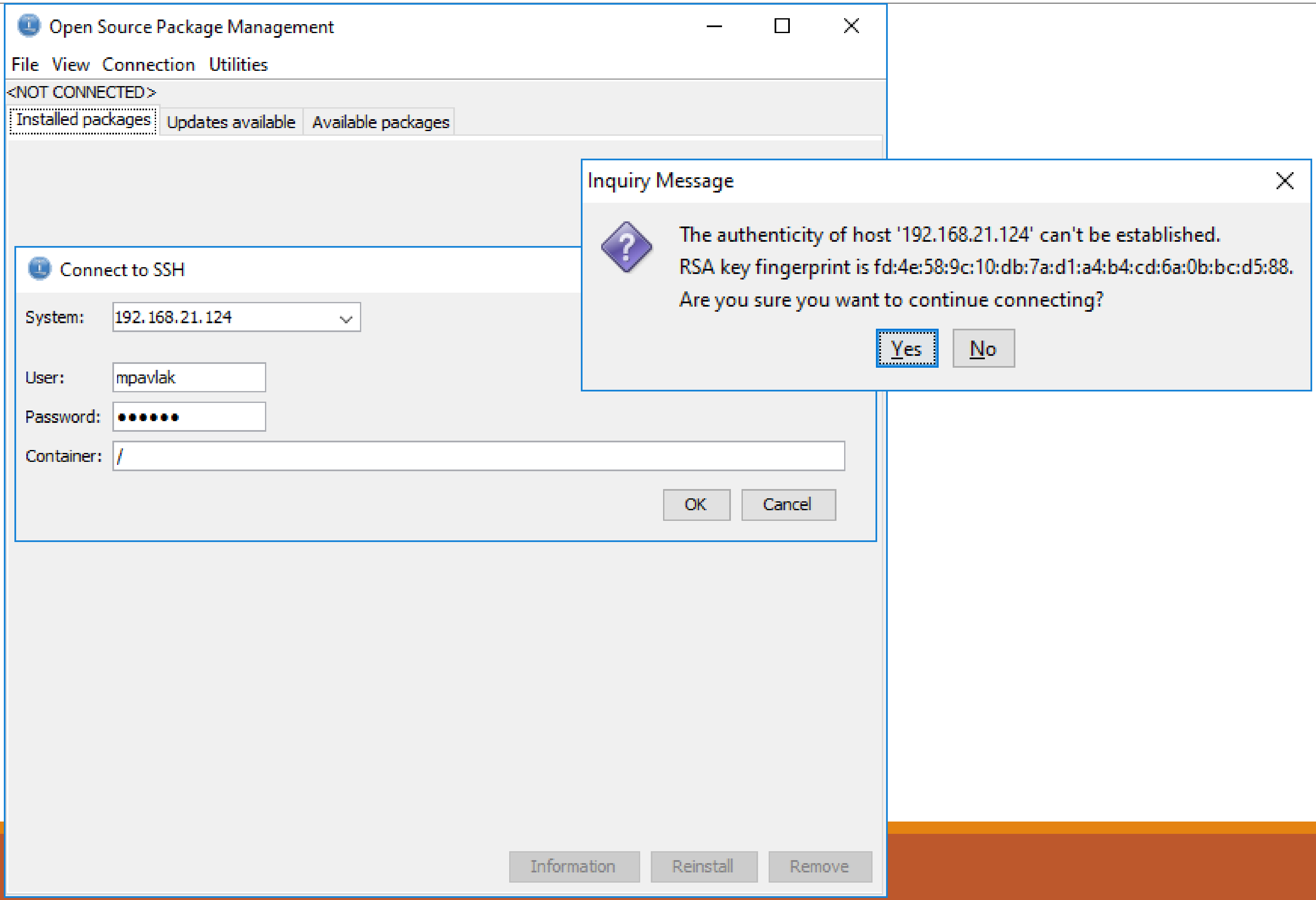
Use ACS to do the heavy lifting!



pts is a useful tool for running SQL statements and CL

es a system configuration. To add or change a system elect **System Configurations** from the **Management** tasks.

Select system and credentials



<NOT CONNECTED>

System: 192.168.21.124

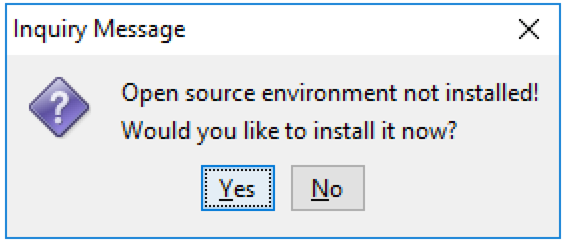
User: mpavlak

Password: ••••••

Container: /

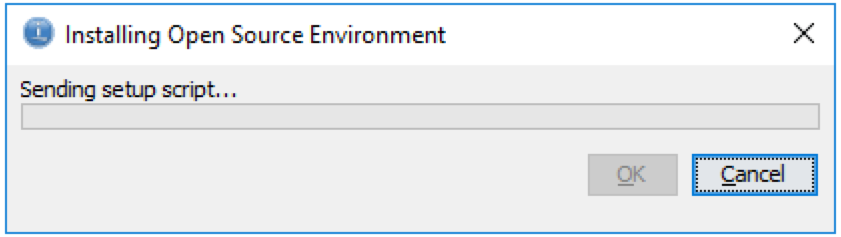
The authenticity of host '192.168.21.124' can't be established.
RSA key fingerprint is fd:4e:58:9c:10:db:7a:d1:a4:b4:cd:6a:0b:bc:d5:88.
Are you sure you want to continue connecting?

Install, watch and enjoy!



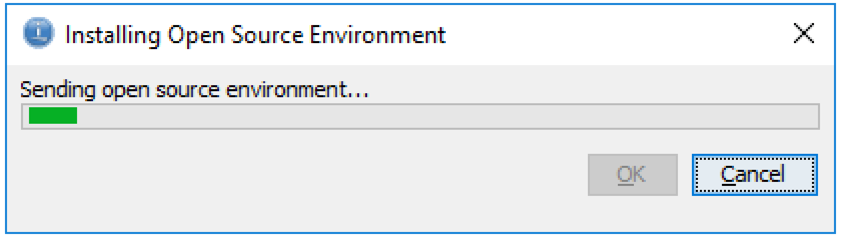
Inquiry Message

Open source environment not installed!
Would you like to install it now?



Installing Open Source Environment

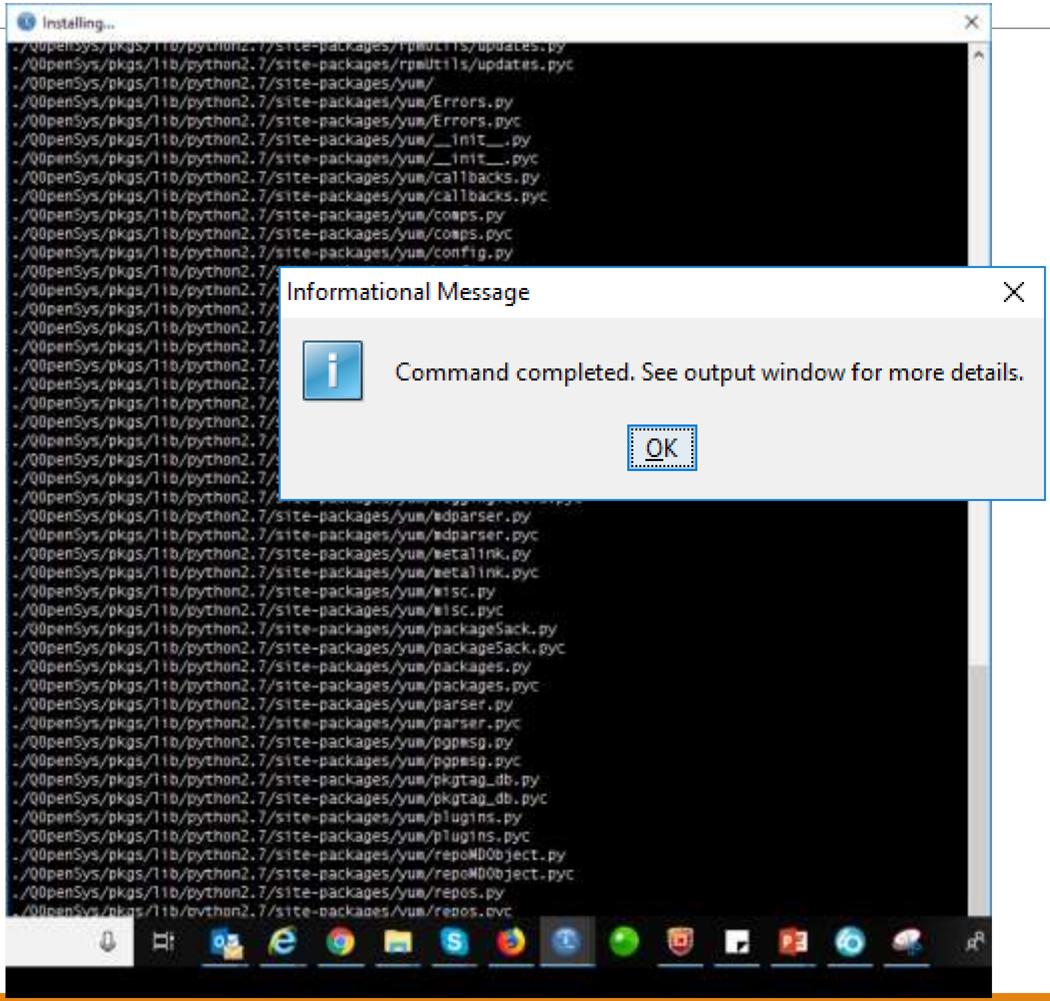
Sending setup script...



Installing Open Source Environment

Sending open source environment...

Watch the screen



```
./QOpenSys/pkgs/lib/python2.7/site-packages/rpmUtils/updates.py
./QOpenSys/pkgs/lib/python2.7/site-packages/rpmUtils/updates.pyc
./QOpenSys/pkgs/lib/python2.7/site-packages/yum/
./QOpenSys/pkgs/lib/python2.7/site-packages/yum/Errors.py
./QOpenSys/pkgs/lib/python2.7/site-packages/yum/Errors.pyc
./QOpenSys/pkgs/lib/python2.7/site-packages/yum/__init__.py
./QOpenSys/pkgs/lib/python2.7/site-packages/yum/__init__.pyc
./QOpenSys/pkgs/lib/python2.7/site-packages/yum/callbacks.py
./QOpenSys/pkgs/lib/python2.7/site-packages/yum/callbacks.pyc
./QOpenSys/pkgs/lib/python2.7/site-packages/yum/comps.py
./QOpenSys/pkgs/lib/python2.7/site-packages/yum/comps.pyc
./QOpenSys/pkgs/lib/python2.7/site-packages/yum/config.py
./QOpenSys/pkgs/lib/python2.7/
./QOpenSys/pkgs/lib/python2.7/
./QOpenSys/pkgs/lib/python2.7/
./QOpenSys/pkgs/lib/python2.7/
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./QOpenSys/pkgs/lib/python2.7/
./QOpenSys/pkgs/lib/python2.7/
./QOpenSys/pkgs/lib/python2.7/
./QOpenSys/pkgs/lib/python2.7/
./QOpenSys/pkgs/lib/python2.7/site-packages/yum/mdparser.py
./QOpenSys/pkgs/lib/python2.7/site-packages/yum/mdparser.pyc
./QOpenSys/pkgs/lib/python2.7/site-packages/yum/metalink.py
./QOpenSys/pkgs/lib/python2.7/site-packages/yum/metalink.pyc
./QOpenSys/pkgs/lib/python2.7/site-packages/yum/misc.py
./QOpenSys/pkgs/lib/python2.7/site-packages/yum/misc.pyc
./QOpenSys/pkgs/lib/python2.7/site-packages/yum/packageSack.py
./QOpenSys/pkgs/lib/python2.7/site-packages/yum/packageSack.pyc
./QOpenSys/pkgs/lib/python2.7/site-packages/yum/packages.py
./QOpenSys/pkgs/lib/python2.7/site-packages/yum/packages.pyc
./QOpenSys/pkgs/lib/python2.7/site-packages/yum/parser.py
./QOpenSys/pkgs/lib/python2.7/site-packages/yum/parser.pyc
./QOpenSys/pkgs/lib/python2.7/site-packages/yum/pgpmsg.py
./QOpenSys/pkgs/lib/python2.7/site-packages/yum/pgpmsg.pyc
./QOpenSys/pkgs/lib/python2.7/site-packages/yum/pkgtag_db.py
./QOpenSys/pkgs/lib/python2.7/site-packages/yum/pkgtag_db.pyc
./QOpenSys/pkgs/lib/python2.7/site-packages/yum/plugins.py
./QOpenSys/pkgs/lib/python2.7/site-packages/yum/plugins.pyc
./QOpenSys/pkgs/lib/python2.7/site-packages/yum/repoMDObject.py
./QOpenSys/pkgs/lib/python2.7/site-packages/yum/repoMDObject.pyc
./QOpenSys/pkgs/lib/python2.7/site-packages/yum/repos.py
./QOpenSys/pkgs/lib/python2.7/site-packages/yum/repos.pyc
```
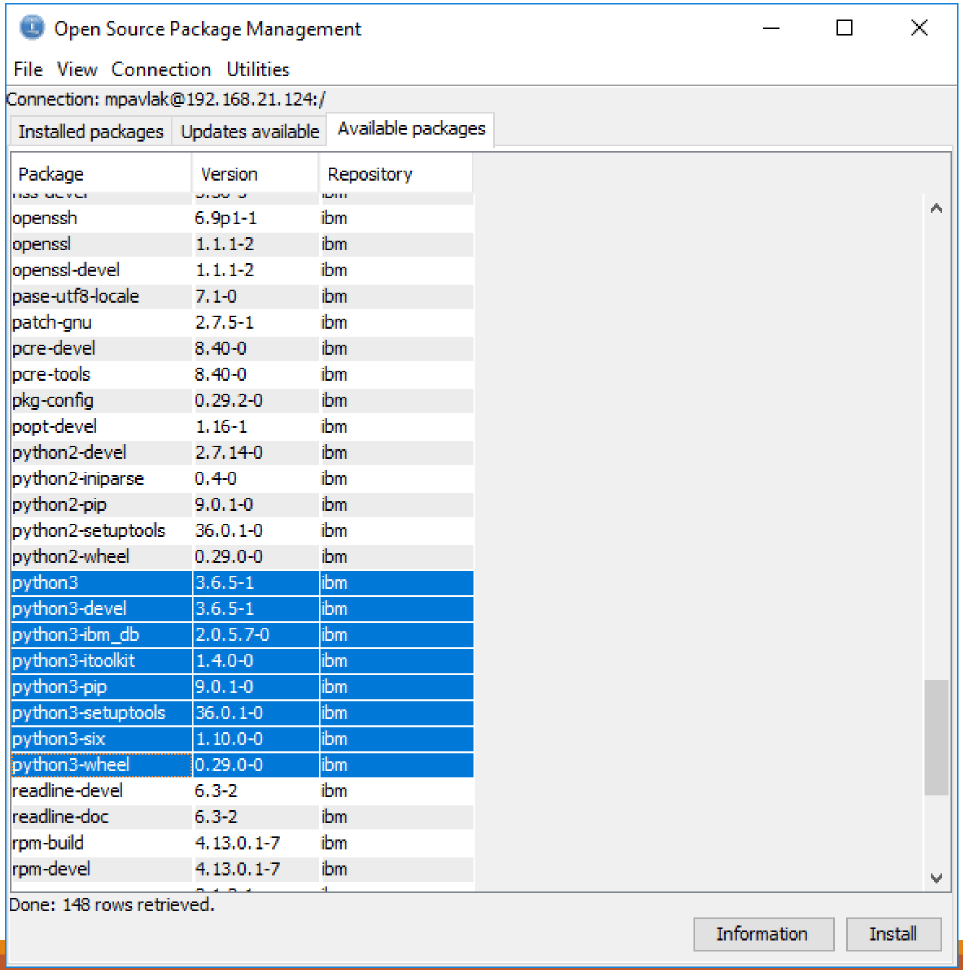

Command completed. See output window for more details.

Now install Python3



Open Source Package Management
File View Connection Utilities

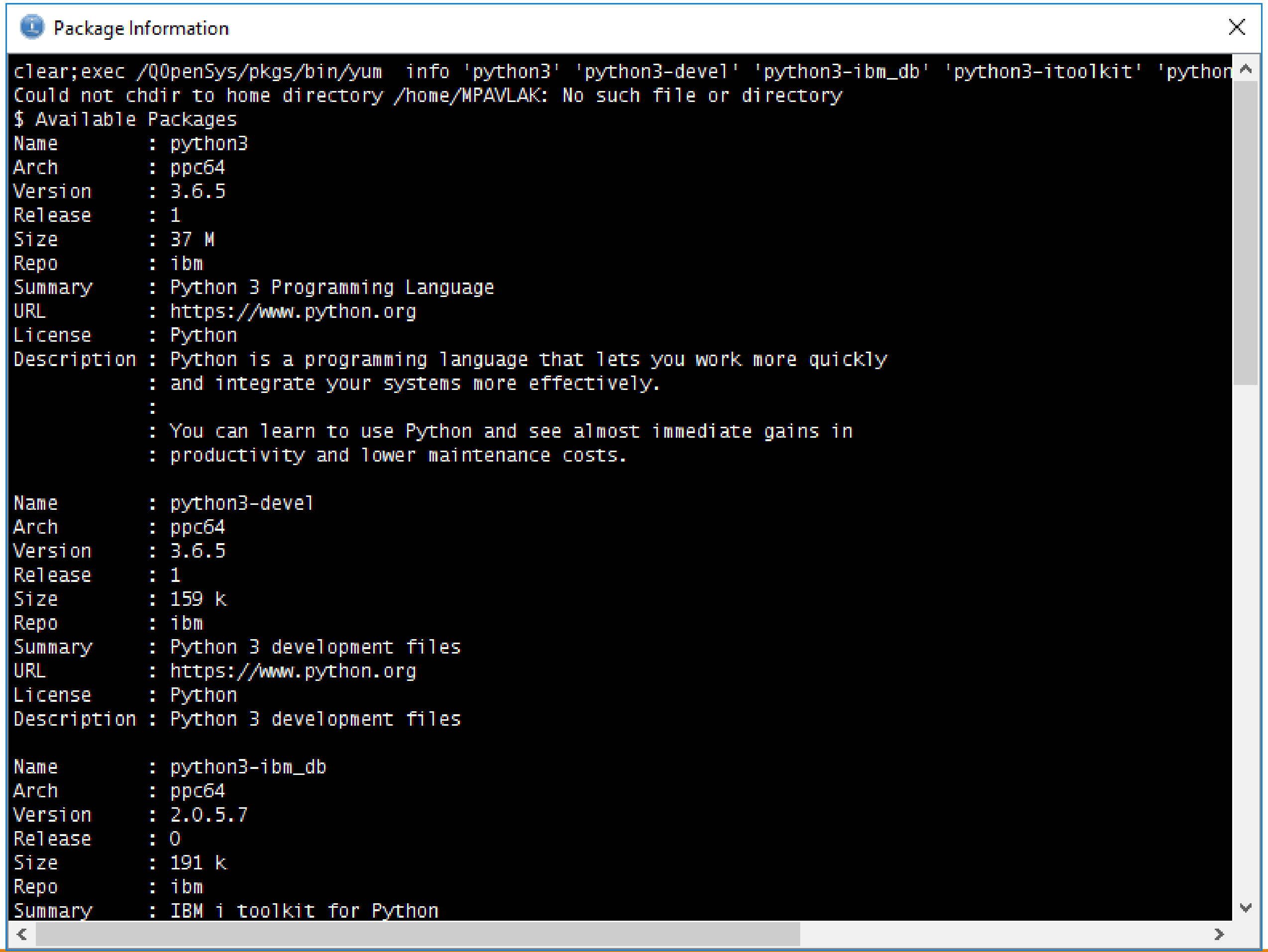
Connection: mpavlak@192.168.21.124:/

Installed packages | Updates available | Available packages

Package	Version	Repository
openssh	6.9p1-1	ibm
openssl	1.1.1-2	ibm
openssl-devel	1.1.1-2	ibm
pase-utf8-locale	7.1-0	ibm
patch-gnu	2.7.5-1	ibm
pcre-devel	8.40-0	ibm
pcre-tools	8.40-0	ibm
pkg-config	0.29.2-0	ibm
popt-devel	1.16-1	ibm
python2-devel	2.7.14-0	ibm
python2-iniparse	0.4-0	ibm
python2-pip	9.0.1-0	ibm
python2-setuptools	36.0.1-0	ibm
python2-wheel	0.29.0-0	ibm
python3	3.6.5-1	ibm
python3-devel	3.6.5-1	ibm
python3-ibm_db	2.0.5.7-0	ibm
python3-itoolkit	1.4.0-0	ibm
python3-pip	9.0.1-0	ibm
python3-setuptools	36.0.1-0	ibm
python3-six	1.10.0-0	ibm
python3-wheel	0.29.0-0	ibm
readline-devel	6.3-2	ibm
readline-doc	6.3-2	ibm
rpm-build	4.13.0.1-7	ibm
rpm-devel	4.13.0.1-7	ibm

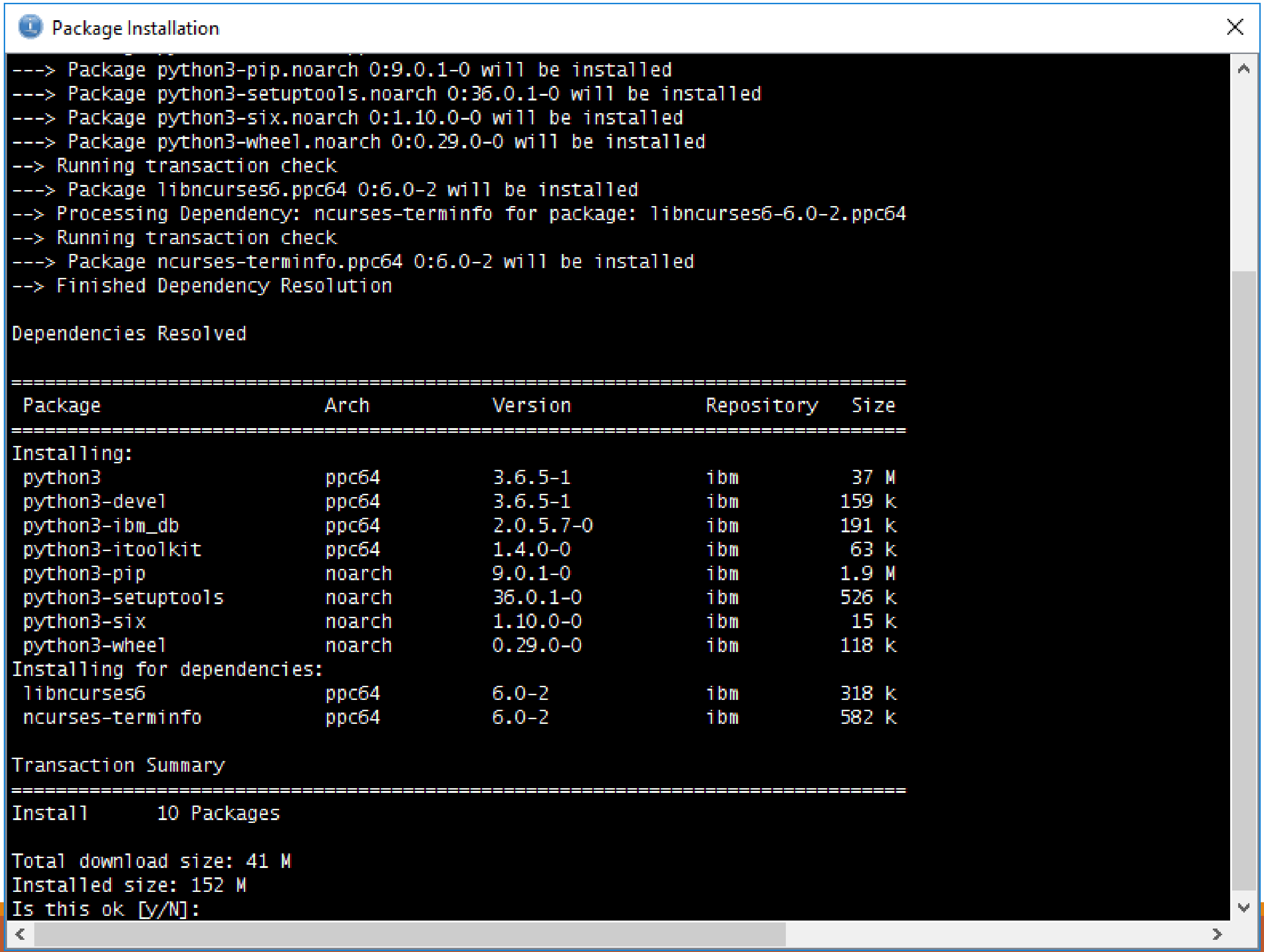
Done: 148 rows retrieved.

Info command



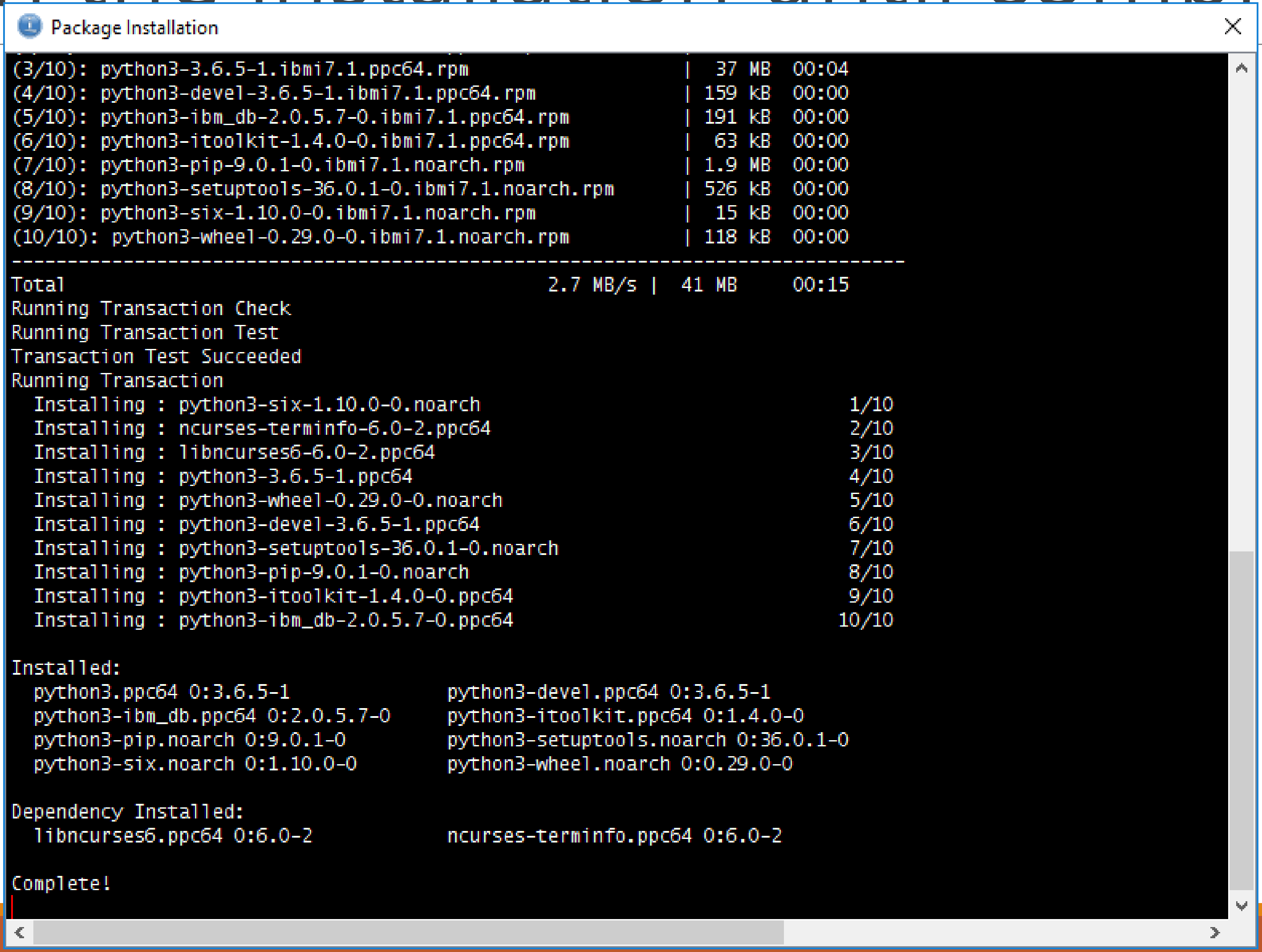
```
clear;exec /QOpenSys/pkgs/bin/yum  info 'python3' 'python3-devel' 'python3-ibm_db' 'python3-itoolkit' 'python
Could not chdir to home directory /home/MPAVLAK: No such file or directory
$ Available Packages
Name        : python3
Arch        : ppc64
Version     : 3.6.5
Release     : 1
Size        : 37 M
Repo        : ibm
Summary     : Python 3 Programming Language
URL         : https://www.python.org
License     : Python
Description : Python is a programming language that lets you work more quickly
            : and integrate your systems more effectively.
            :
            : You can learn to use Python and see almost immediate gains in
            : productivity and lower maintenance costs.

Name        : python3-devel
Arch        : ppc64
Version     : 3.6.5
Release     : 1
Size        : 159 k
Repo        : ibm
Summary     : Python 3 development files
URL         : https://www.python.org
License     : Python
Description : Python 3 development files

Name        : python3-ibm_db
Arch        : ppc64
Version     : 2.0.5.7
Release     : 0
Size        : 191 k
Repo        : ibm
Summary     : IBM i toolkit for Python
```

Confirm “Is this ok [y/n]”



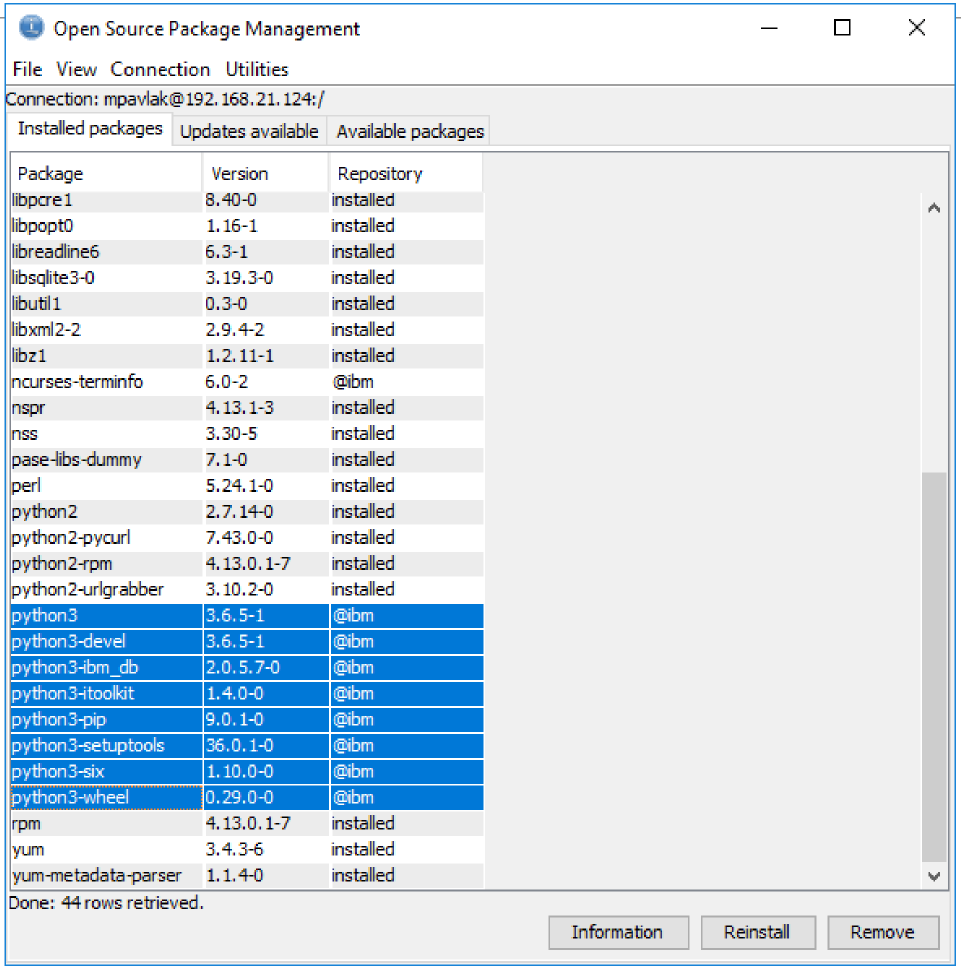
```
---> Package python3-pip.noarch 0:9.0.1-0 will be installed
---> Package python3-setuptools.noarch 0:36.0.1-0 will be installed
---> Package python3-six.noarch 0:1.10.0-0 will be installed
---> Package python3-wheel.noarch 0:0.29.0-0 will be installed
--> Running transaction check
---> Package libncurses6.ppc64 0:6.0-2 will be installed
--> Processing Dependency: ncurses-terminfo for package: libncurses6-6.0-2.ppc64
--> Running transaction check
---> Package ncurses-terminfo.ppc64 0:6.0-2 will be installed
--> Finished Dependency Resolution

Dependencies Resolved

================================================================================
 Package                    Arch           Version            Repository   Size
================================================================================
Installing:
 python3                    ppc64          3.6.5-1            ibm          37 M
 python3-devel              ppc64          3.6.5-1            ibm         159 k
 python3-ibm_db             ppc64          2.0.5.7-0          ibm         191 k
 python3-itoolkit           ppc64          1.4.0-0            ibm          63 k
 python3-pip                noarch         9.0.1-0            ibm         1.9 M
 python3-setuptools         noarch         36.0.1-0           ibm         526 k
 python3-six                noarch         1.10.0-0           ibm          15 k
 python3-wheel              noarch         0.29.0-0           ibm         118 k
Installing for dependencies:
 libncurses6                ppc64          6.0-2              ibm         318 k
 ncurses-terminfo           ppc64          6.0-2              ibm         582 k

Transaction Summary
================================================================================
Install      10 Packages

Total download size: 41 M
Installed size: 152 M
Is this ok [y/N]:
```

Watch the installation until complete



```
(3/10): python3-3.6.5-1.ibmi7.1.ppc64.rpm                 |  37 MB  00:04
(4/10): python3-devel-3.6.5-1.ibmi7.1.ppc64.rpm           | 159 kB  00:00
(5/10): python3-ibm_db-2.0.5.7-0.ibmi7.1.ppc64.rpm        | 191 kB  00:00
(6/10): python3-itoolkit-1.4.0-0.ibmi7.1.ppc64.rpm        |  63 kB  00:00
(7/10): python3-pip-9.0.1-0.ibmi7.1.noarch.rpm            | 1.9 MB  00:00
(8/10): python3-setuptools-36.0.1-0.ibmi7.1.noarch.rpm    | 526 kB  00:00
(9/10): python3-six-1.10.0-0.ibmi7.1.noarch.rpm           |  15 kB  00:00
(10/10): python3-wheel-0.29.0-0.ibmi7.1.noarch.rpm        | 118 kB  00:00
--------------------------------------------------------------------------------
Total                                           2.7 MB/s |  41 MB     00:15
Running Transaction Check
Running Transaction Test
Transaction Test Succeeded
Running Transaction
  Installing : python3-six-1.10.0-0.noarch                                 1/10
  Installing : ncurses-terminfo-6.0-2.ppc64                                2/10
  Installing : libncurses6-6.0-2.ppc64                                     3/10
  Installing : python3-3.6.5-1.ppc64                                       4/10
  Installing : python3-wheel-0.29.0-0.noarch                               5/10
  Installing : python3-devel-3.6.5-1.ppc64                                 6/10
  Installing : python3-setuptools-36.0.1-0.noarch                          7/10
  Installing : python3-pip-9.0.1-0.noarch                                  8/10
  Installing : python3-itoolkit-1.4.0-0.ppc64                              9/10
  Installing : python3-ibm_db-2.0.5.7-0.ppc64                             10/10

Installed:
  python3.ppc64 0:3.6.5-1                python3-devel.ppc64 0:3.6.5-1
  python3-ibm_db.ppc64 0:2.0.5.7-0       python3-itoolkit.ppc64 0:1.4.0-0
  python3-pip.noarch 0:9.0.1-0           python3-setuptools.noarch 0:36.0.1-0
  python3-six.noarch 0:1.10.0-0          python3-wheel.noarch 0:0.29.0-0

Dependency Installed:
  libncurses6.ppc64 0:6.0-2              ncurses-terminfo.ppc64 0:6.0-2

Complete!
```

Looking back at ACS in the installed tab…



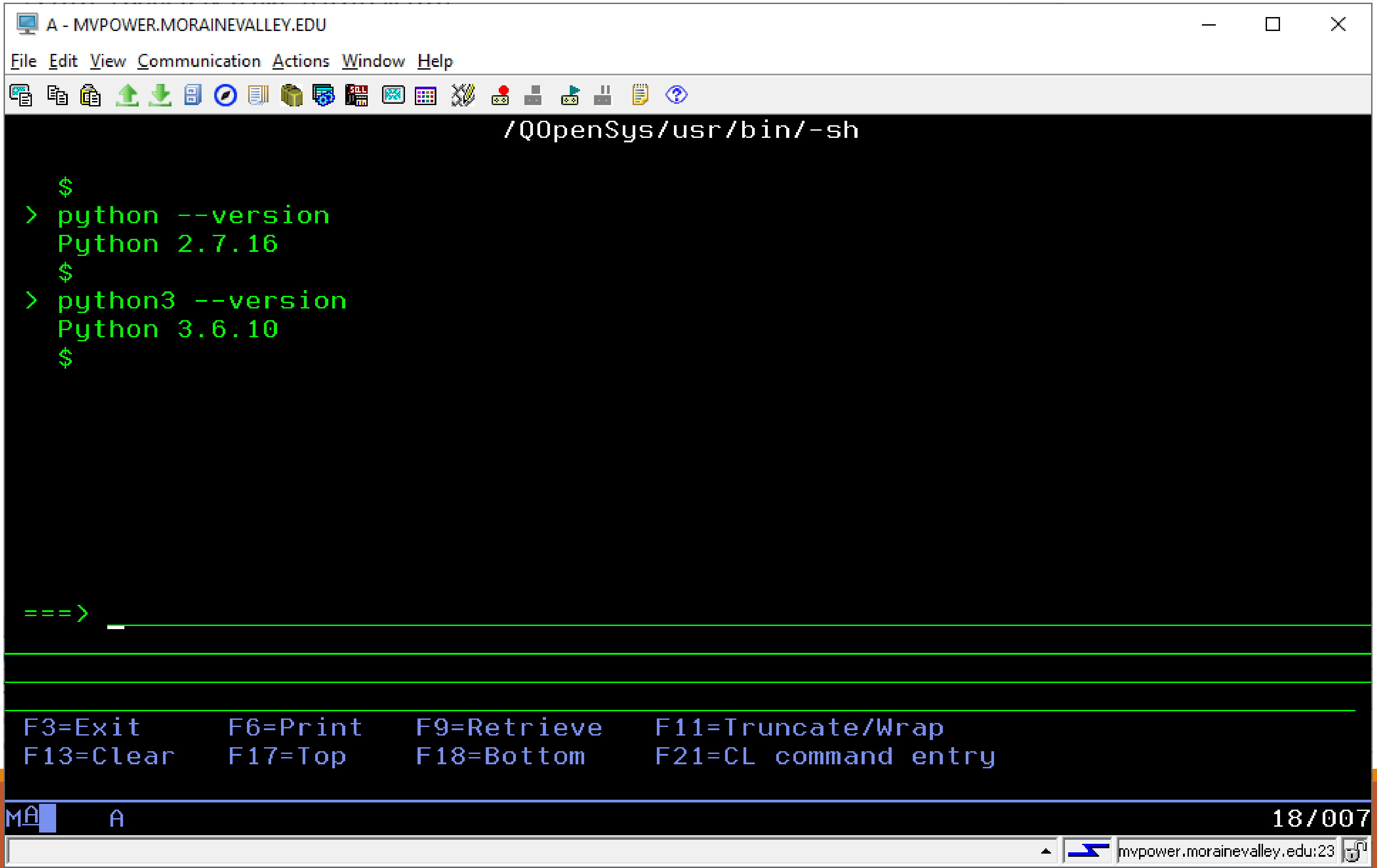
Connection: mpavlak@192.168.21.124:/

Package	Version	Repository
libpcre1	8.40-0	installed
libpopt0	1.16-1	installed
libreadline6	6.3-1	installed
libsqlite3-0	3.19.3-0	installed
libutil1	0.3-0	installed
libxml2-2	2.9.4-2	installed
libz1	1.2.11-1	installed
ncurses-terminfo	6.0-2	@ibm
nspr	4.13.1-3	installed
nss	3.30-5	installed
pase-libs-dummy	7.1-0	installed
perl	5.24.1-0	installed
python2	2.7.14-0	installed
python2-pycurl	7.43.0-0	installed
python2-rpm	4.13.0.1-7	installed
python2-urlgrabber	3.10.2-0	installed
python3	3.6.5-1	@ibm
python3-devel	3.6.5-1	@ibm
python3-ibm_db	2.0.5.7-0	@ibm
python3-itoolkit	1.4.0-0	@ibm
python3-pip	9.0.1-0	@ibm
python3-setuptools	36.0.1-0	@ibm
python3-six	1.10.0-0	@ibm
python3-wheel	0.29.0-0	@ibm
rpm	4.13.0.1-7	installed
yum	3.4.3-6	installed
yum-metadata-parser	1.1.4-0	installed

Done: 44 rows retrieved.

Python in action

Command line via green screen

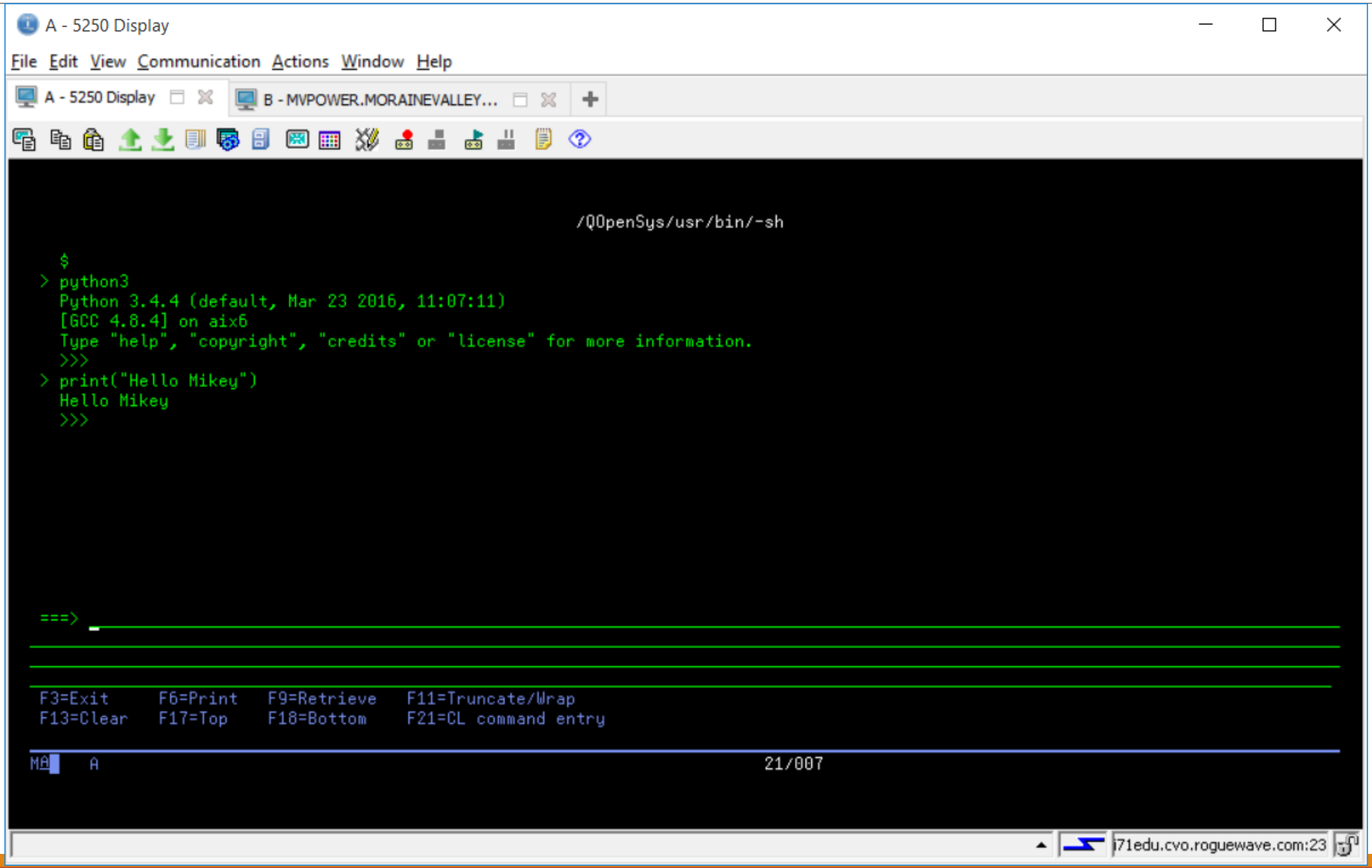


A - MVPOWER.MORAINEVALLEY.EDU
File Edit View Communication Actions Window Help

```
                         /QOpenSys/usr/bin/-sh

   $
 > python --version
   Python 2.7.16
   $
 > python3 --version
   Python 3.6.10
   $








===> _



F3=Exit      F6=Print     F9=Retrieve    F11=Truncate/Wrap
F13=Clear    F17=Top      F18=Bottom     F21=CL command entry
```

MA   A   18/007
mvpower.morainevalley.edu:23

Hello World


A - 5250 Display
File Edit View Communication Actions Window Help
A - 5250 Display
B - MVPOWER.MORAINEVALLEY...
i71edu.cvo.roguewave.com:23

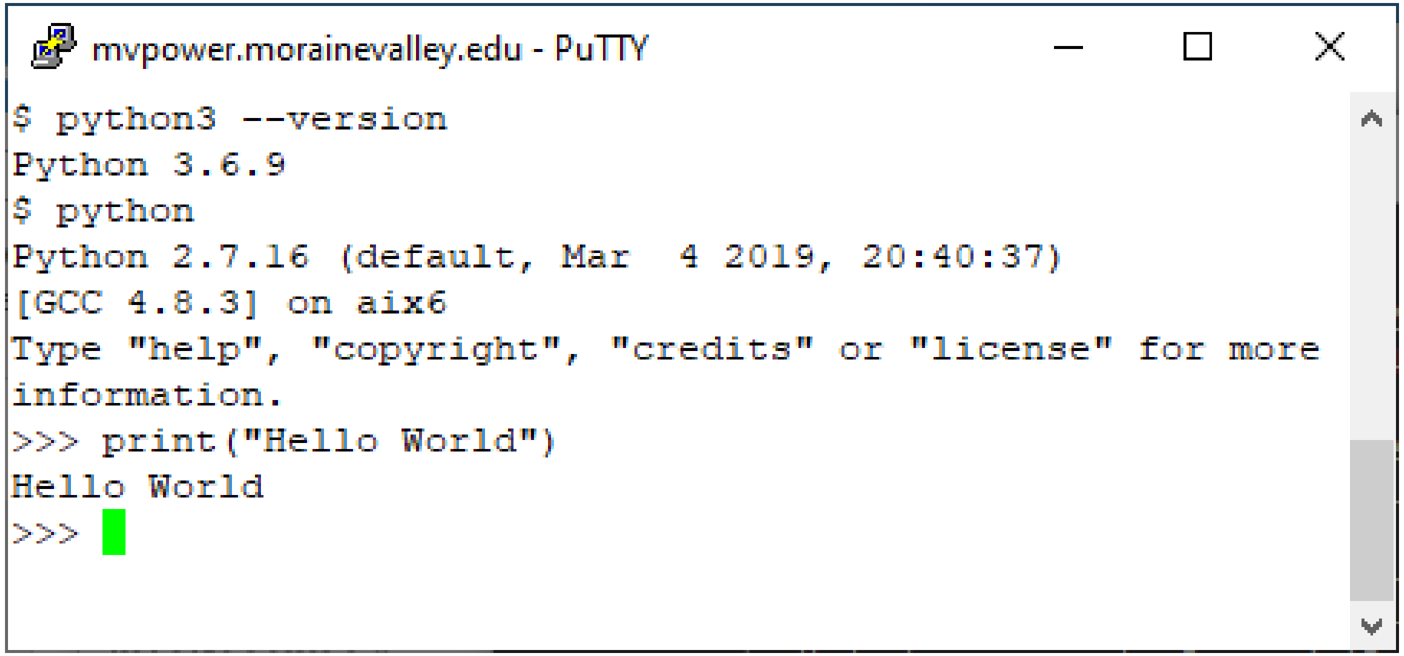
```
                                    /QOpenSys/usr/bin/-sh

  $
> python3
  Python 3.4.4 (default, Mar 23 2016, 11:07:11)
  [GCC 4.8.4] on aix6
  Type "help", "copyright", "credits" or "license" for more information.
  >>>
> print("Hello Mikey")
  Hello Mikey
  >>>










===> _




F3=Exit      F6=Print     F9=Retrieve     F11=Truncate/Wrap
F13=Clear    F17=Top      F18=Bottom      F21=CL command entry

MA     A                                                  21/007
```

Most prefer SSH

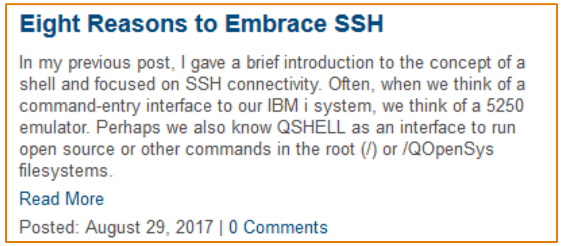
Command line via SSH terminal

- Recommended strongly by Jesse!

http://ibmsystemsmag.com/blogs/open-your-i/



```
$ python3 --version
Python 3.6.9
$ python
Python 2.7.16 (default, Mar  4 2019, 20:40:37)
[GCC 4.8.3] on aix6
Type "help", "copyright", "credits" or "license" for more
information.
>>> print("Hello World")
Hello World
>>> 
```



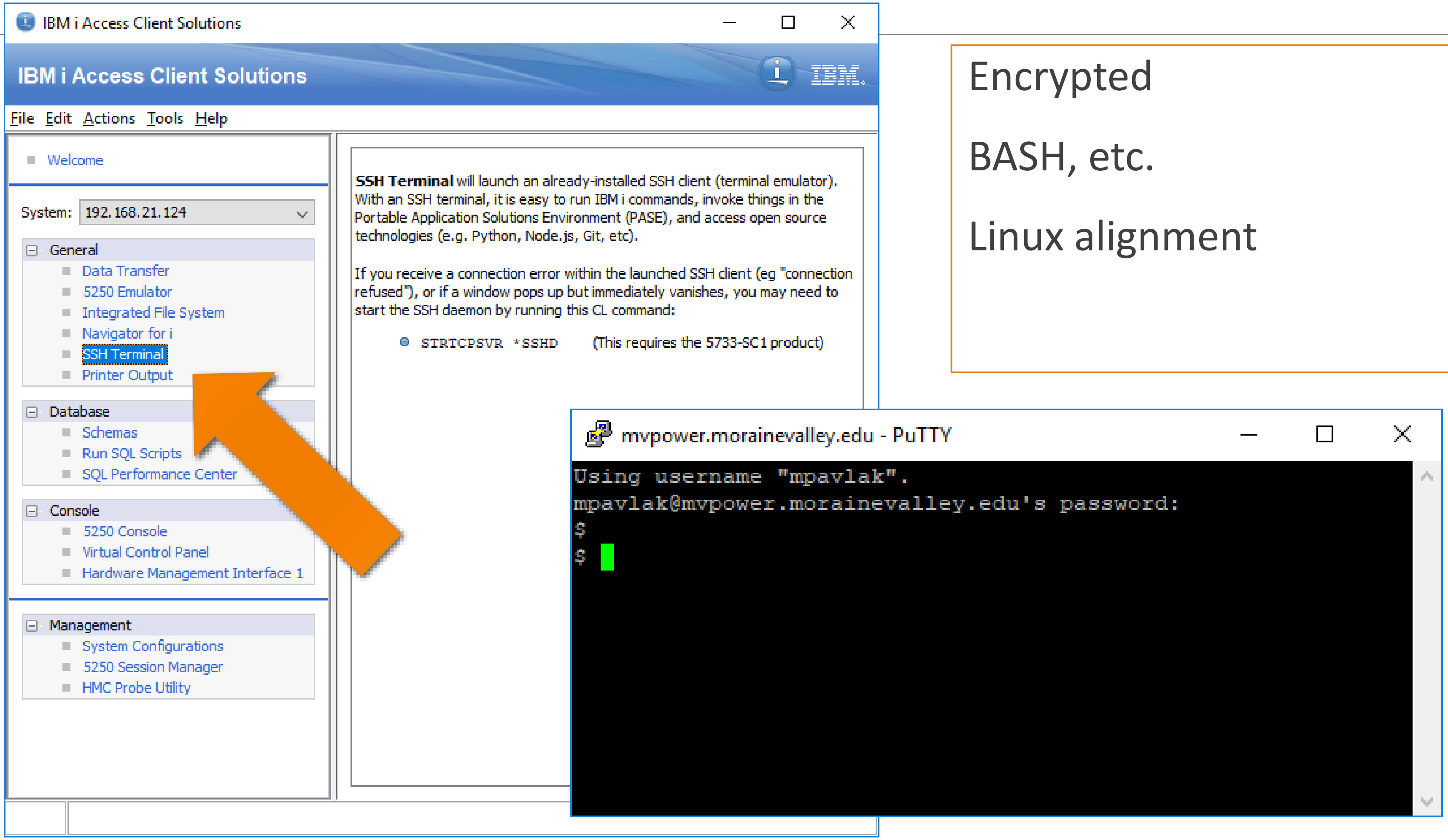
Eight Reasons to Embrace SSH

In my previous post, I gave a brief introduction to the concept of a shell and focused on SSH connectivity. Often, when we think of a command-entry interface to our IBM i system, we think of a 5250 emulator. Perhaps we also know QSHELL as an interface to run open source or other commands in the root (/) or /QOpenSys filesystems.

Read More

Posted: August 29, 2017 | 0 Comments

Shell available in ACS (shortcut PuTTY)



SSH Terminal will launch an already-installed SSH client (terminal emulator). With an SSH terminal, it is easy to run IBM i commands, invoke things in the Portable Application Solutions Environment (PASE), and access open source technologies (e.g. Python, Node.js, Git, etc).

If you receive a connection error within the launched SSH client (eg "connection refused"), or if a window pops up but immediately vanishes, you may need to start the SSH daemon by running this CL command:

- `STRTCPSVR *SSHD` (This requires the 5733-SC1 product)

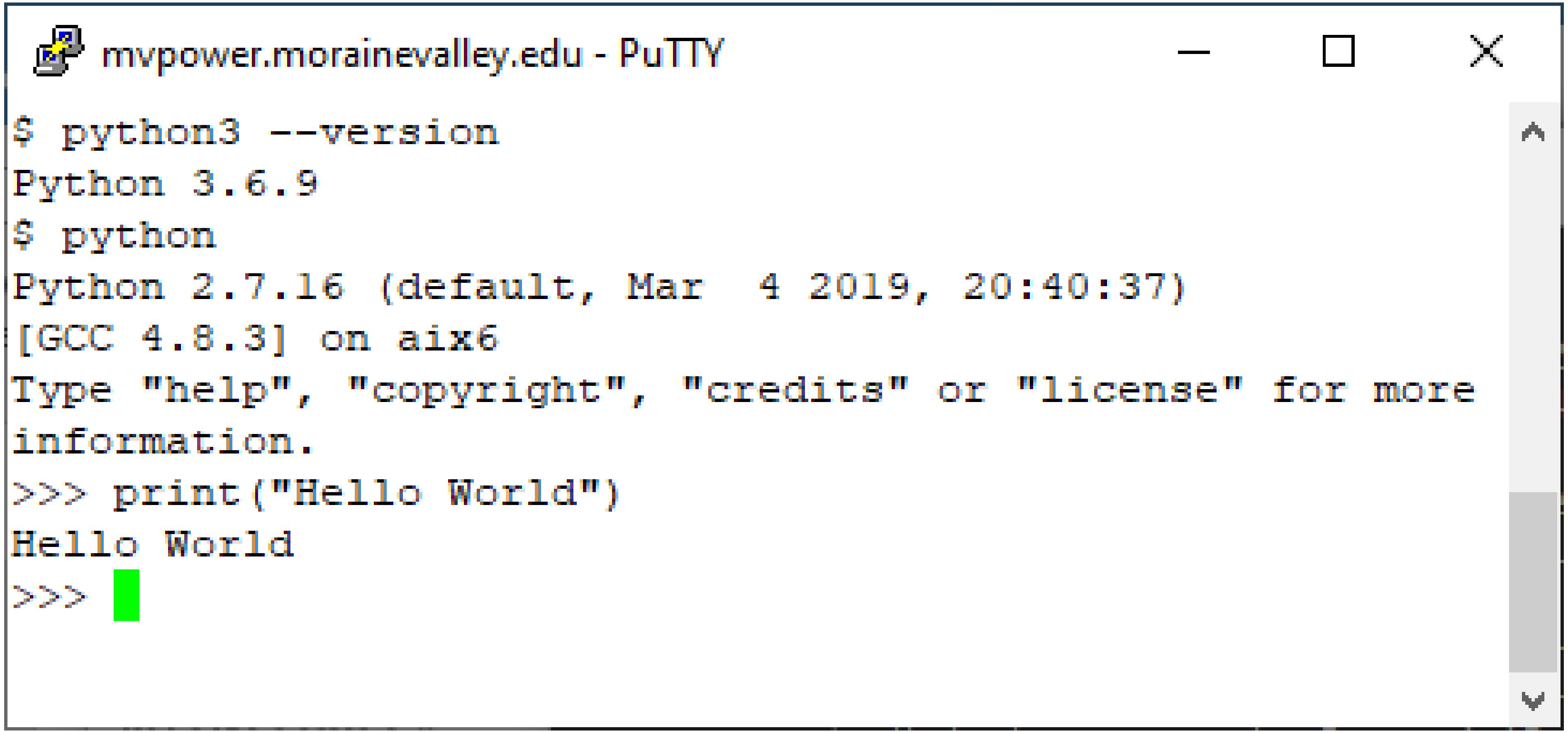
```
Using username "mpavlak".
mpavlak@mvpower.morainevalley.edu's password:
$
$
```

Encrypted

BASH, etc.

Linux alignment

Hello World, again...



```
$ python3 --version
Python 3.6.9
$ python
Python 2.7.16 (default, Mar  4 2019, 20:40:37)
[GCC 4.8.3] on aix6
Type "help", "copyright", "credits" or "license" for more
information.
>>> print("Hello World")
Hello World
>>> 
```

IDE

RDi

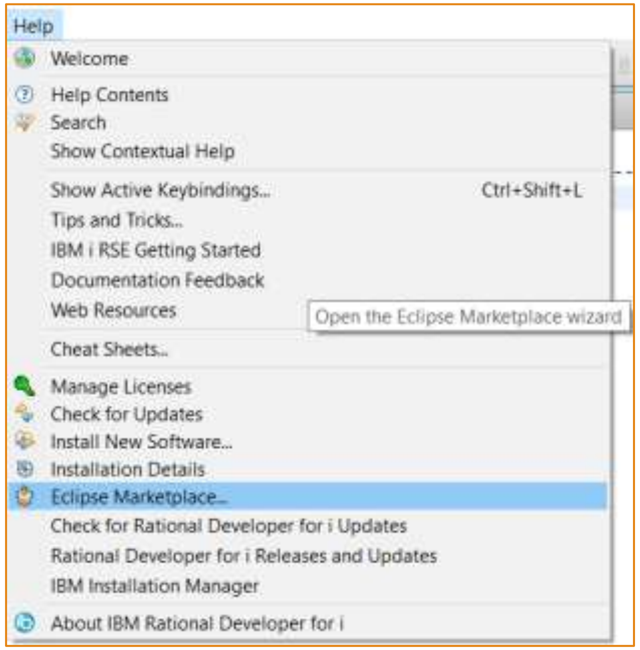
Can use free Eclipse, as well.

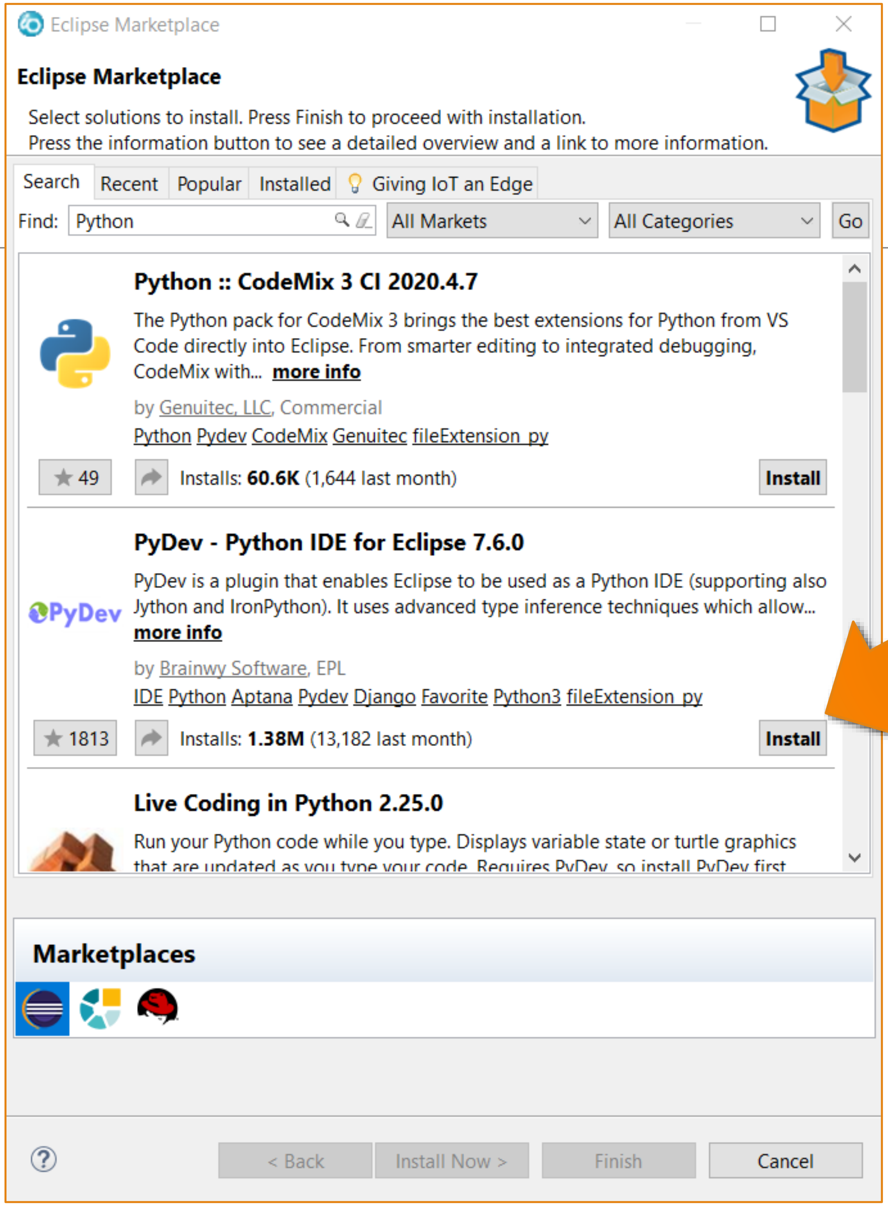
- Consider something from Eclipse.org
- I grabbed PyDev

Marketplace

Head to the Eclipse Marketplace

- Type Python in search
- Press find
- For PyDev, click Install





Eclipse Marketplace

Select solutions to install. Press Finish to proceed with installation.
Press the information button to see a detailed overview and a link to more information.

Find: Python | All Markets | All Categories | Go

Python :: CodeMix 3 CI 2020.4.7

The Python pack for CodeMix 3 brings the best extensions for Python from VS Code directly into Eclipse. From smarter editing to integrated debugging, CodeMix with... **more info**

by Genuitec, LLC, Commercial

Python Pydev CodeMix Genuitec fileExtension_py

★ 49 Installs: **60.6K** (1,644 last month) **Install**

PyDev - Python IDE for Eclipse 7.6.0

PyDev is a plugin that enables Eclipse to be used as a Python IDE (supporting also Jython and IronPython). It uses advanced type inference techniques which allow... **more info**

by Brainwy Software, EPL

IDE Python Aptana Pydev Django Favorite Python3 fileExtension_py

★ 1813 Installs: **1.38M** (13,182 last month) **Install**

Live Coding in Python 2.25.0

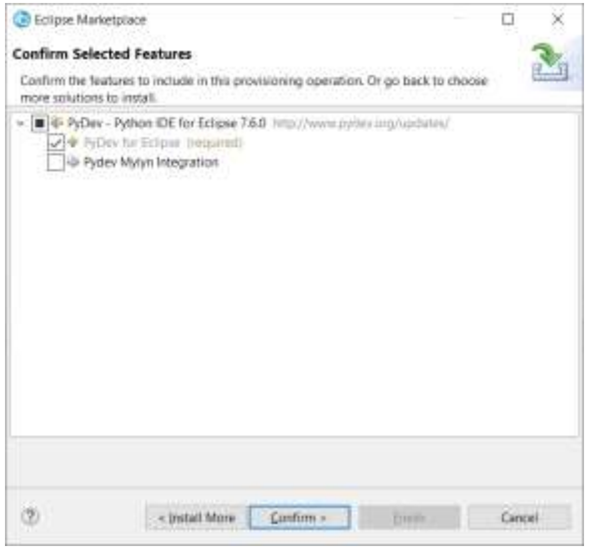
Run your Python code while you type. Displays variable state or turtle graphics that are updated as you type your code. Requires PyDev, so install PyDev first.

Marketplaces

PyDev Install

Eclipse will find the features

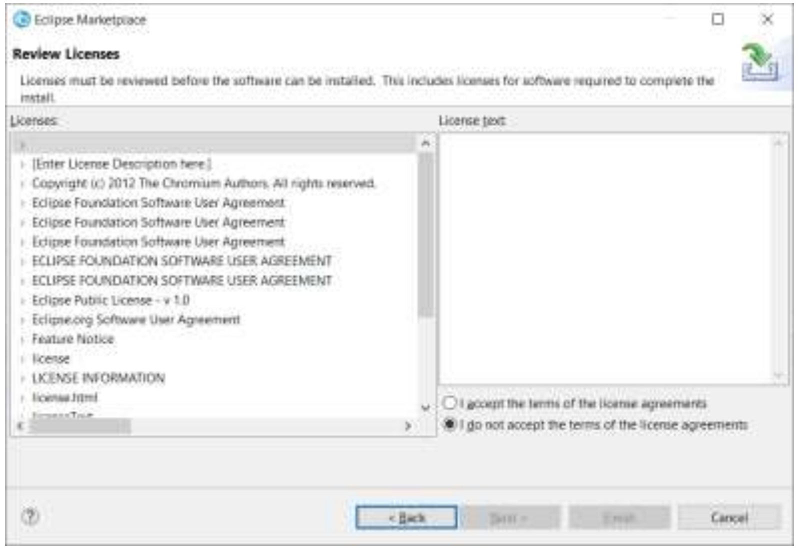
- I skip Mylyn integration
- Press Confirm then accept the EULA & press Finish



Confirm Selected Features

Confirm the features to include in this provisioning operation. Or go back to choose more solutions to install.

- ■ PyDev - Python IDE for Eclipse 7.6.0 http://www.pydev.org/updates/
  - ☑ PyDev for Eclipse (required)
  - □ Pydev Mylyn Integration



Review Licenses

Licenses must be reviewed before the software can be installed. This includes licenses for software required to complete the install.

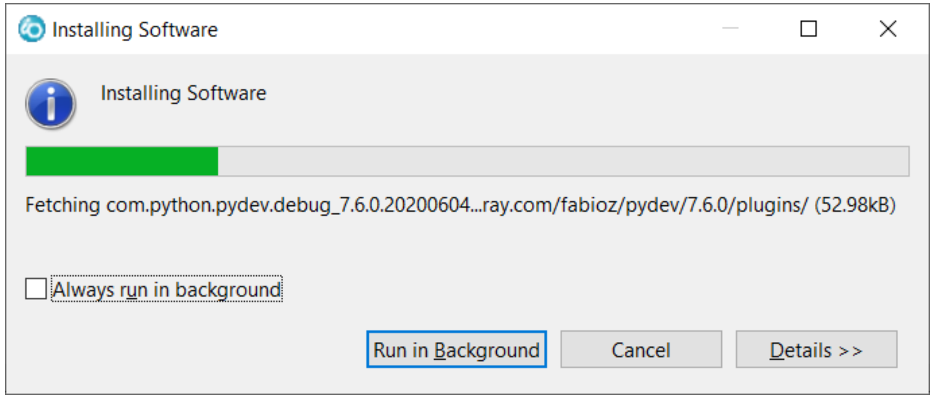
Licenses:

- [Enter License Description here.]
- Copyright (c) 2012 The Chromium Authors. All rights reserved.
- Eclipse Foundation Software User Agreement
- Eclipse Foundation Software User Agreement
- Eclipse Foundation Software User Agreement
- ECLIPSE FOUNDATION SOFTWARE USER AGREEMENT
- ECLIPSE FOUNDATION SOFTWARE USER AGREEMENT
- Eclipse Public License - v 1.0
- Eclipse.org Software User Agreement
- Feature Notice
- license
- LICENSE INFORMATION
- license.html
- licenseText

License text:

○ I accept the terms of the license agreements

● I do not accept the terms of the license agreements

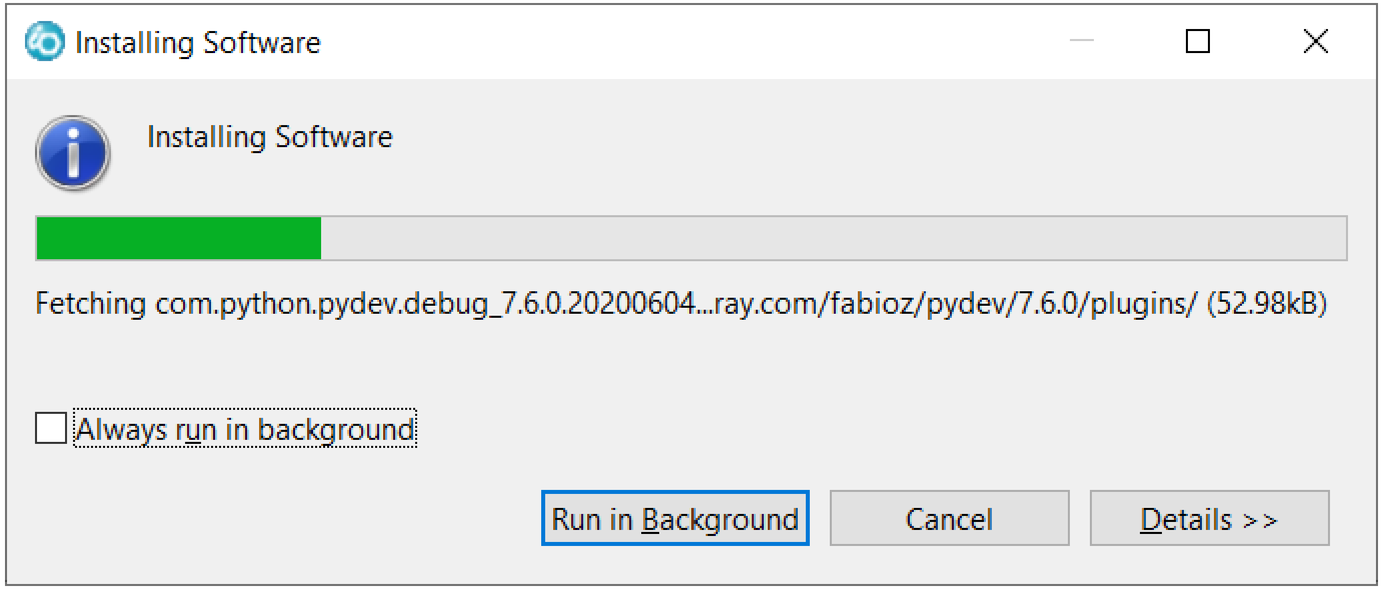


Installing Software

Fetching com.python.pydev.debug_7.6.0.20200604...ray.com/fabioz/pydev/7.6.0/plugins/ (52.98kB)

□ Always run in background

Watch the pretty status bar

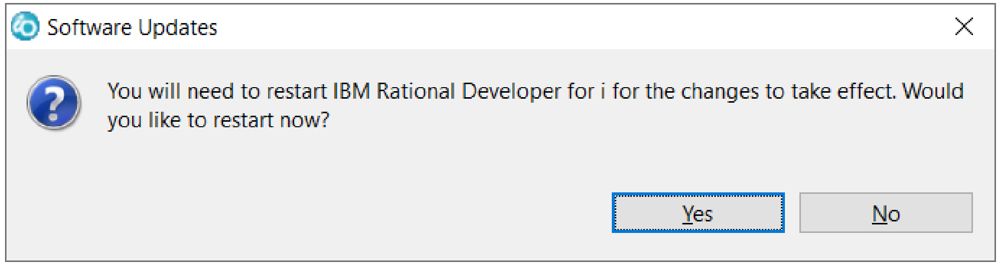


Installing Software

Installing Software

Fetching com.python.pydev.debug_7.6.0.20200604...ray.com/fabioz/pydev/7.6.0/plugins/ (52.98kB)

□ Always run in background

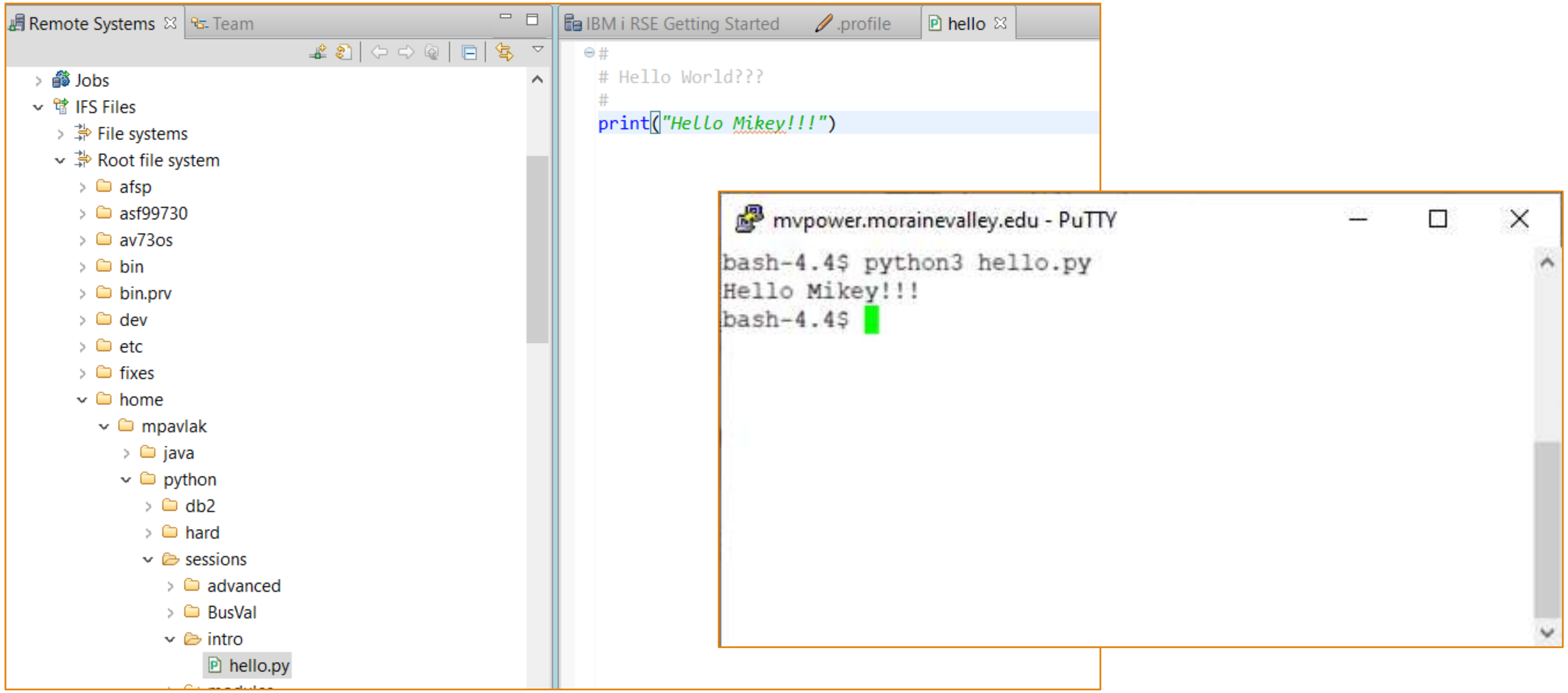


Software Updates

You will need to restart IBM Rational Developer for i for the changes to take effect. Would you like to restart now?

Python in Eclipse (i.e. Zend Studio)

RDi works, too!



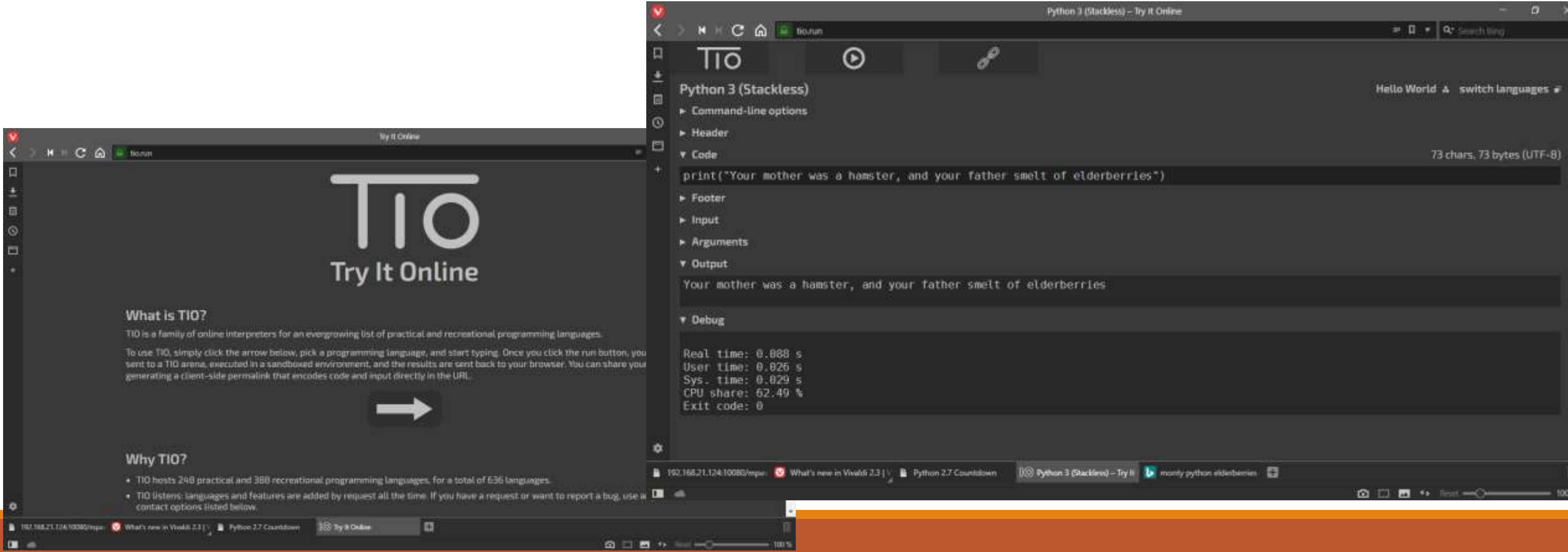
```
#
# Hello World???
#
print("Hello Mikey!!!")
```

```
bash-4.4$ python3 hello.py
Hello Mikey!!!
bash-4.4$
```

Alternatives to IBM i when learning

What’s that? The boss won’t let you install Python on the IBM i?

- Consider tio.run



Try It Online

What is TIO?

TIO is a family of online interpreters for an evergrowing list of practical and recreational programming languages.

To use TIO, simply click the arrow below, pick a programming language, and start typing. Once you click the run button, you
sent to a TIO arena, executed in a sandboxed environment, and the results are sent back to your browser. You can share your
generating a client-side permalink that encodes code and input directly in the URL.

Why TIO?

- TIO hosts 248 practical and 388 recreational programming languages, for a total of 636 languages.
- TIO listens: languages and features are added by request all the time. If you have a request or want to report a bug, use a
  contact options listed below.

Python 3 (Stackless)

```
print("Your mother was a hamster, and your father smelt of elderberries")
```

```
Your mother was a hamster, and your father smelt of elderberries
```

```
Real time: 0.088 s
User time: 0.026 s
Sys. time: 0.029 s
CPU share: 62.49 %
Exit code: 0
```

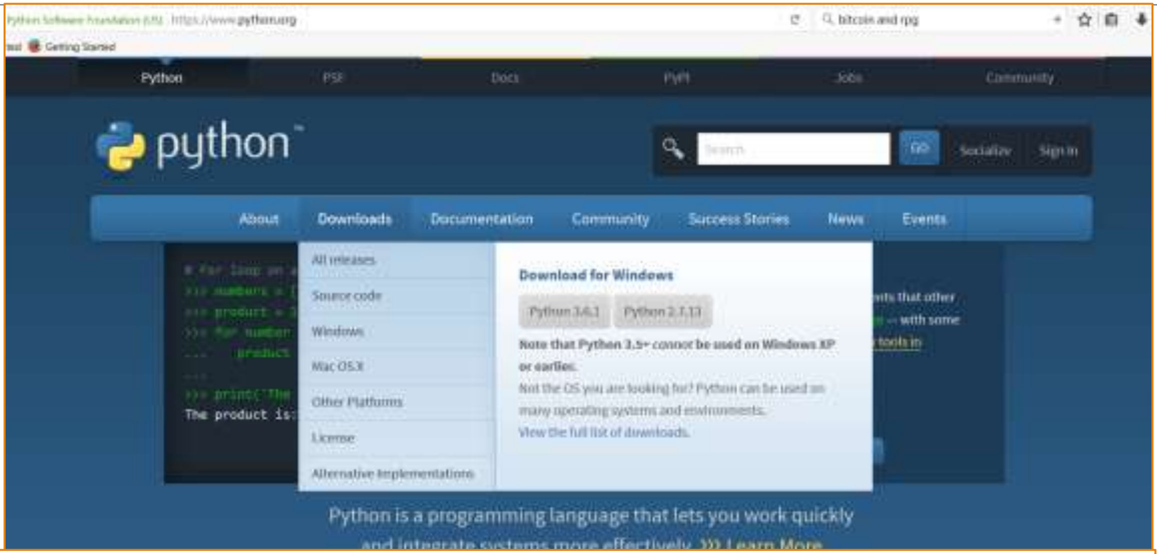
192.168.21.124:10080/mpu
What's new in Vivaldi 2.3 |
Python 2.7 Countdown
Python 3 (Stackless) – Try It
monty python elderberries

Desktop education at it’s finest

How about your PC?

Head to Python.org site:

- Download
- Install
- Viola!

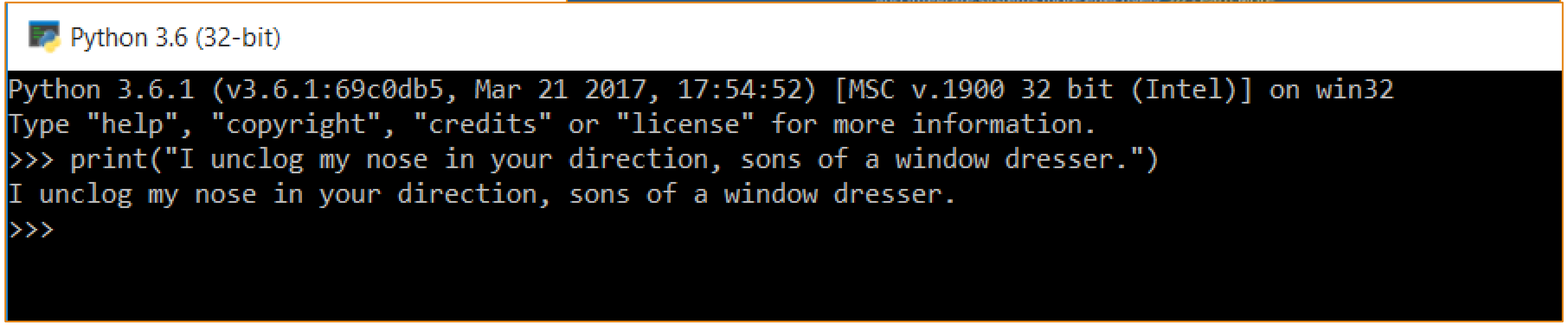


Note that Python 3.5+ cannot be used on Windows XP or earlier.

Not the OS you are looking for? Python can be used on many operating systems and environments.

View the full list of downloads.

Python is a programming language that lets you work quickly and integrate systems more effectively. >>> Learn More



```
Python 3.6.1 (v3.6.1:69c0db5, Mar 21 2017, 17:54:52) [MSC v.1900 32 bit (Intel)] on win32
Type "help", "copyright", "credits" or "license" for more information.
>>> print("I unclog my nose in your direction, sons of a window dresser.")
I unclog my nose in your direction, sons of a window dresser.
>>>
```

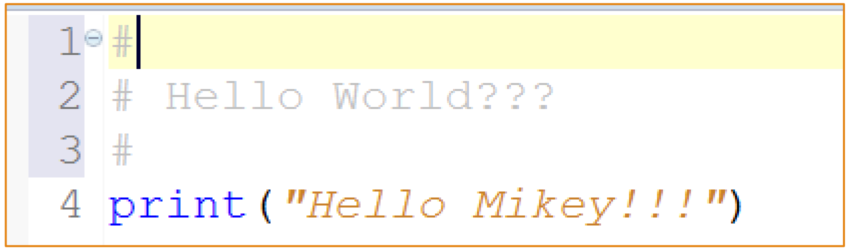
Python Script in IFS

Create a file like Ex01hello.py

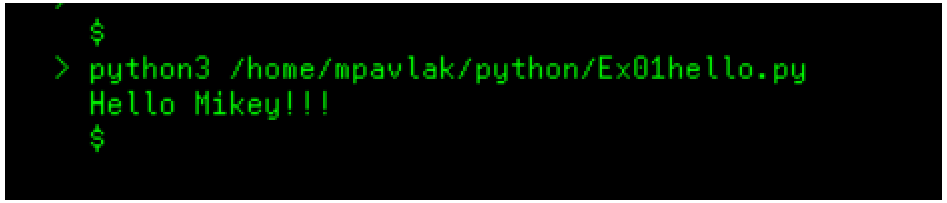
Open the file

Key up some code and click save

Rinse, repeat…



```
#
# Hello World???
#
print("Hello Mikey!!!")
```



```
   $
 > python3 /home/mpavlak/python/Ex01hello.py
   Hello Mikey!!!
   $
```

Python Syntax Fundamentals

How it is written

Indentation means EVERYTHING

- Don’t use tab
- 4 spaces – No more, no less
- Mismatched indents can cause failures. Good luck finding…

No scope terminators like other languages { }

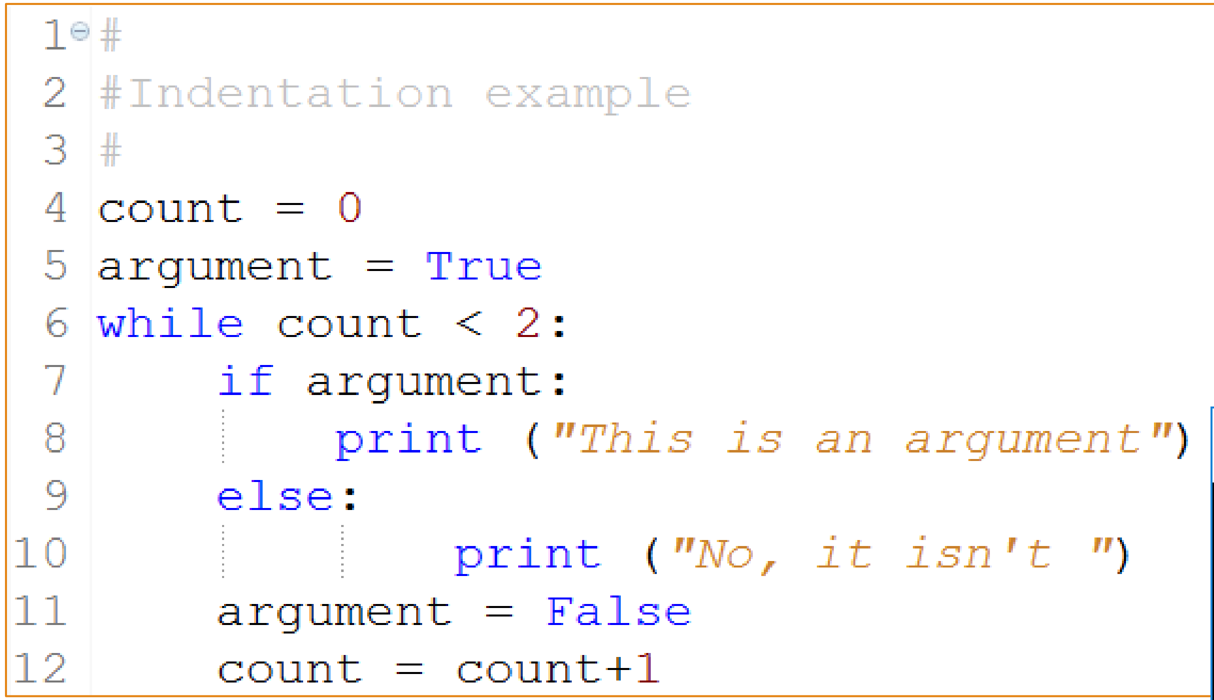
Thou shalt inserteth thy colon and then

- thou wilst indent all thy subservient code or thou wilst perish…

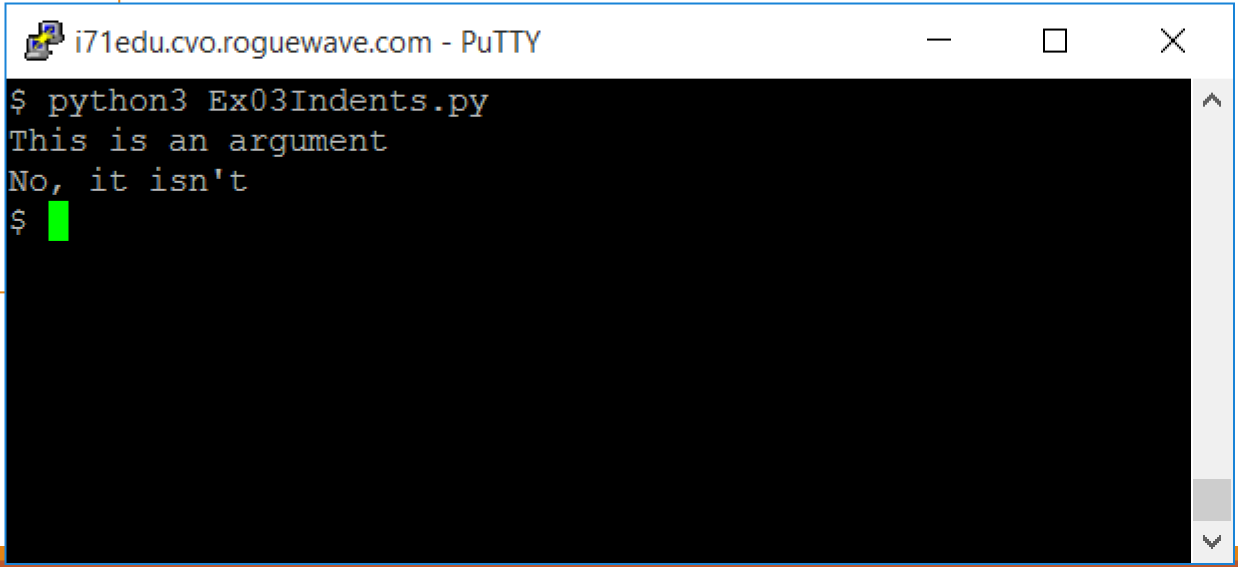
Much more readable than other languages

Get a good editor!!!

Indentation



```
#
#Indentation example
#
count = 0
argument = True
while count < 2:
    if argument:
        print ("This is an argument")
    else:
            print ("No, it isn't ")
    argument = False
    count = count+1
```



```
$ python3 Ex03Indents.py
This is an argument
No, it isn't
$
```

Operators – Similar to other C derivatives

Comparison

- Assignment =
- Comparison ==
- Inequality !=
- Less than <
- Greater than >
- Less than or equal to <=
- Greater than or equal to >=

- Mathematical
  - Addition +
  - Multiplication *
  - Division /
  - Floor division //
  - Modulus %
  - Exponentiation **
- Booleans
  - And
  - Or
  - Not

Syntax

Variables

Data types – yeah…about that…

Int

- Integer of unlimited size

Float

- System defined precision

Strings

- Sequences of character data

Bool

- TRUE & FALSE

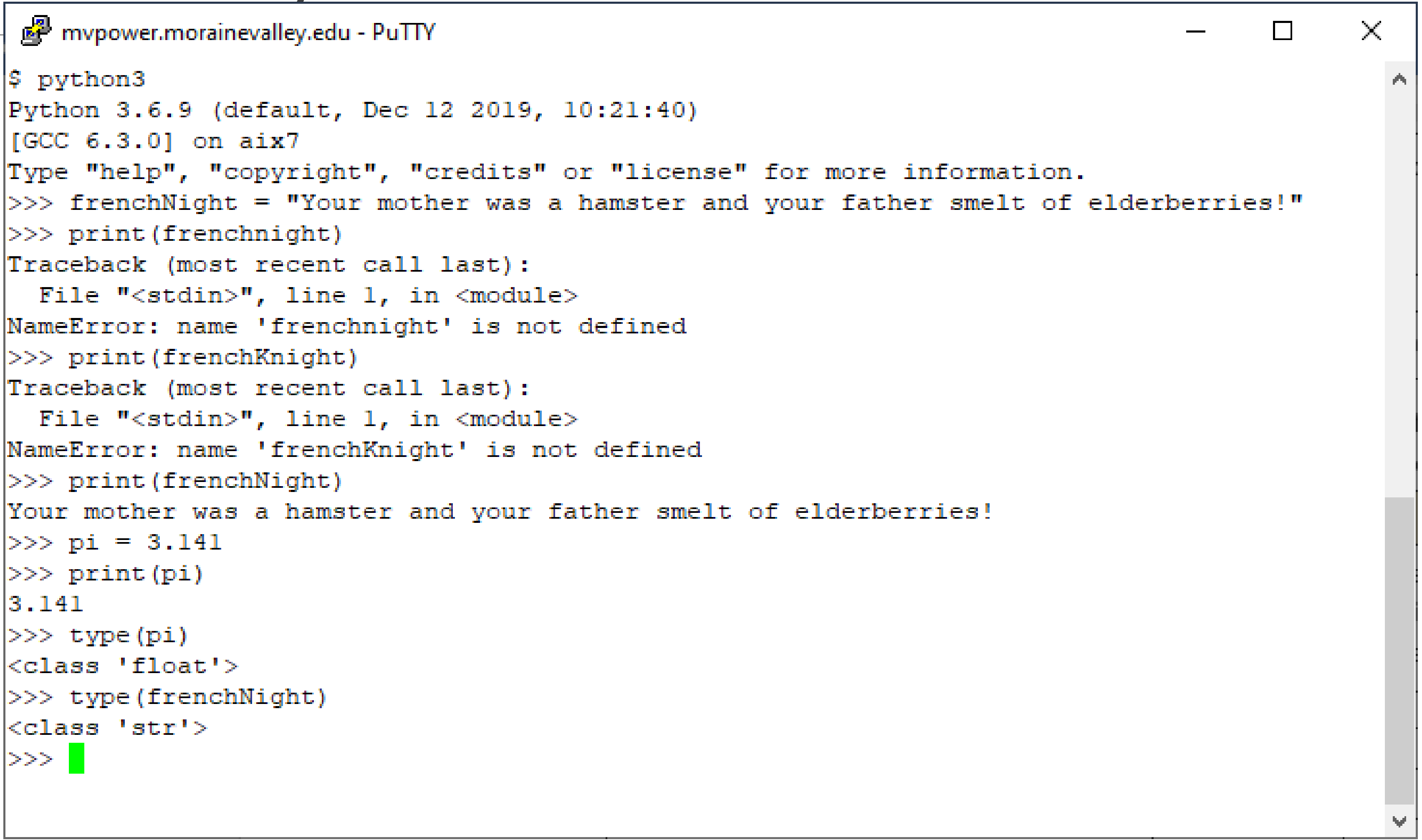
Variables on the fly

Promptor

Case sensitive

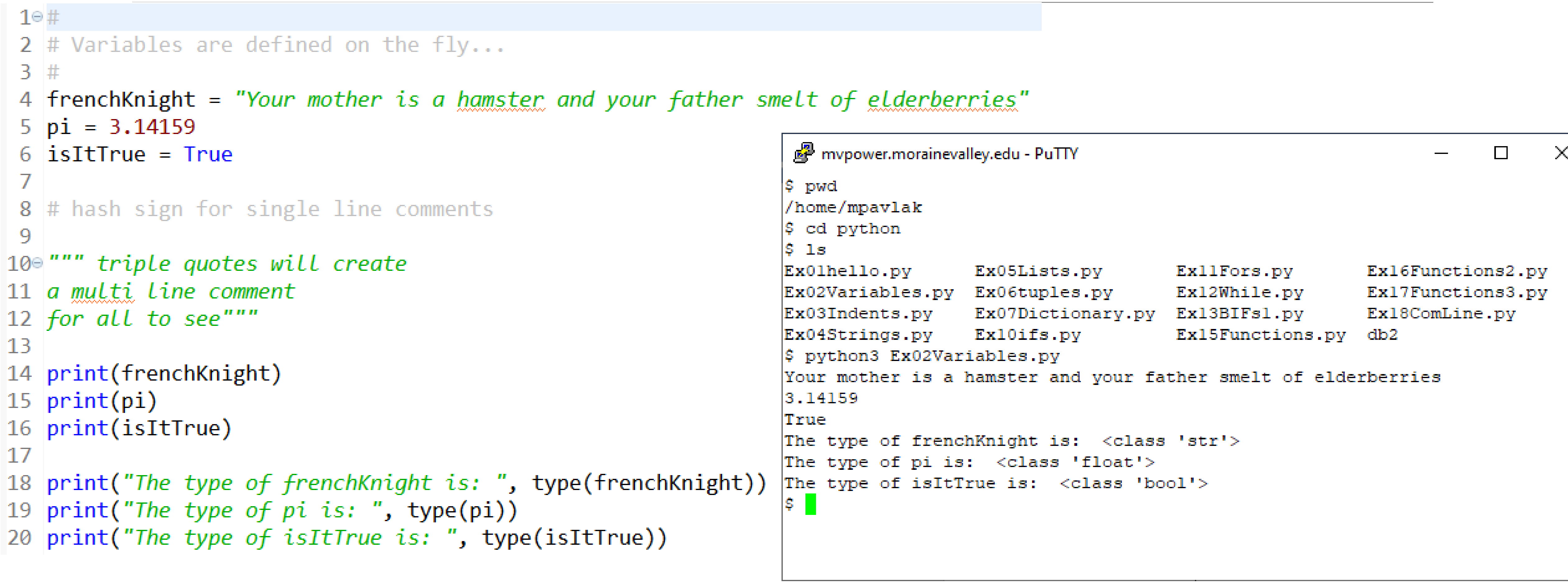
camelCase

Who are you? type()



```
$ python3
Python 3.6.9 (default, Dec 12 2019, 10:21:40)
[GCC 6.3.0] on aix7
Type "help", "copyright", "credits" or "license" for more information.
>>> frenchNight = "Your mother was a hamster and your father smelt of elderberries!"
>>> print(frenchnight)
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
NameError: name 'frenchnight' is not defined
>>> print(frenchKnight)
Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
NameError: name 'frenchKnight' is not defined
>>> print(frenchNight)
Your mother was a hamster and your father smelt of elderberries!
>>> pi = 3.141
>>> print(pi)
3.141
>>> type(pi)
<class 'float'>
>>> type(frenchNight)
<class 'str'>
>>> 
```

Variables in a file with a data type!



```python
#
# Variables are defined on the fly...
#
frenchKnight = "Your mother is a hamster and your father smelt of elderberries"
pi = 3.14159
isItTrue = True

# hash sign for single line comments

""" triple quotes will create
a multi line comment
for all to see"""

print(frenchKnight)
print(pi)
print(isItTrue)

print("The type of frenchKnight is: ", type(frenchKnight))
print("The type of pi is: ", type(pi))
print("The type of isItTrue is: ", type(isItTrue))
```

```
$ pwd
/home/mpavlak
$ cd python
$ ls
Ex01hello.py      Ex05Lists.py       Ex11Fors.py       Ex16Functions2.py
Ex02Variables.py  Ex06tuples.py      Ex12While.py      Ex17Functions3.py
Ex03Indents.py    Ex07Dictionary.py  Ex13BIFs1.py      Ex18ComLine.py
Ex04Strings.py    Ex10ifs.py         Ex15Functions.py  db2
$ python3 Ex02Variables.py
Your mother is a hamster and your father smelt of elderberries
3.14159
True
The type of frenchKnight is:  <class 'str'>
The type of pi is:  <class 'float'>
The type of isItTrue is:  <class 'bool'>
$ 
```

Every variable is implemented as a class

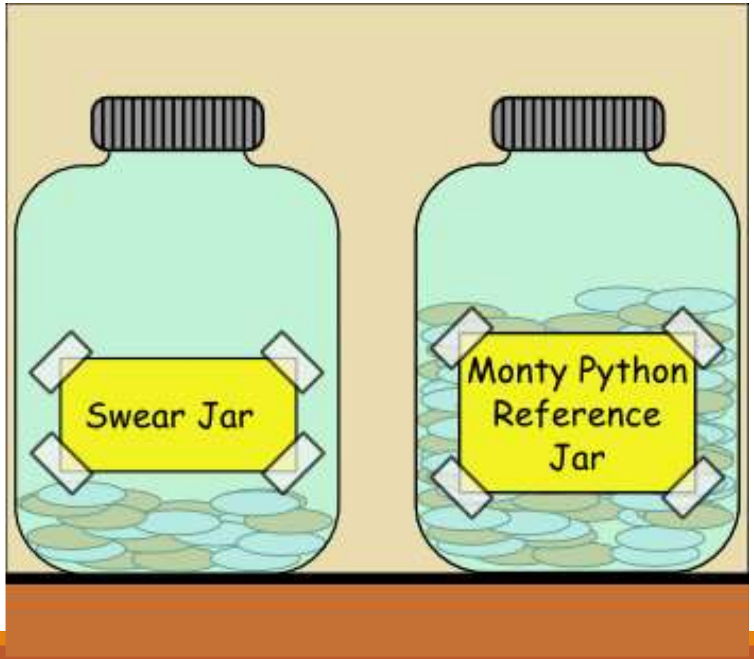
It’s OK…

Monty Python references are not only acceptable…

- They are encouraged!

Documentation is littered with refere

Exampl



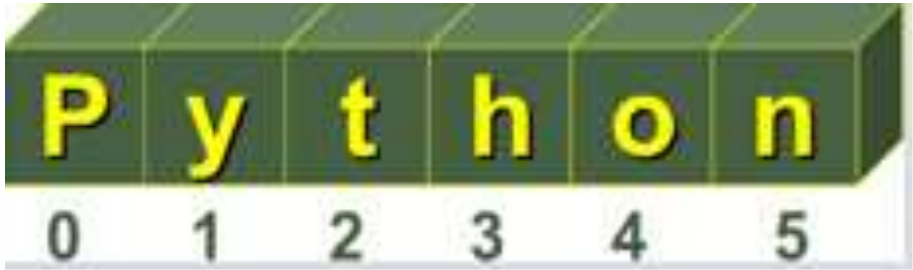
Strings

Immutable objects, cannot change value

Can reassign. (dynamic typing)

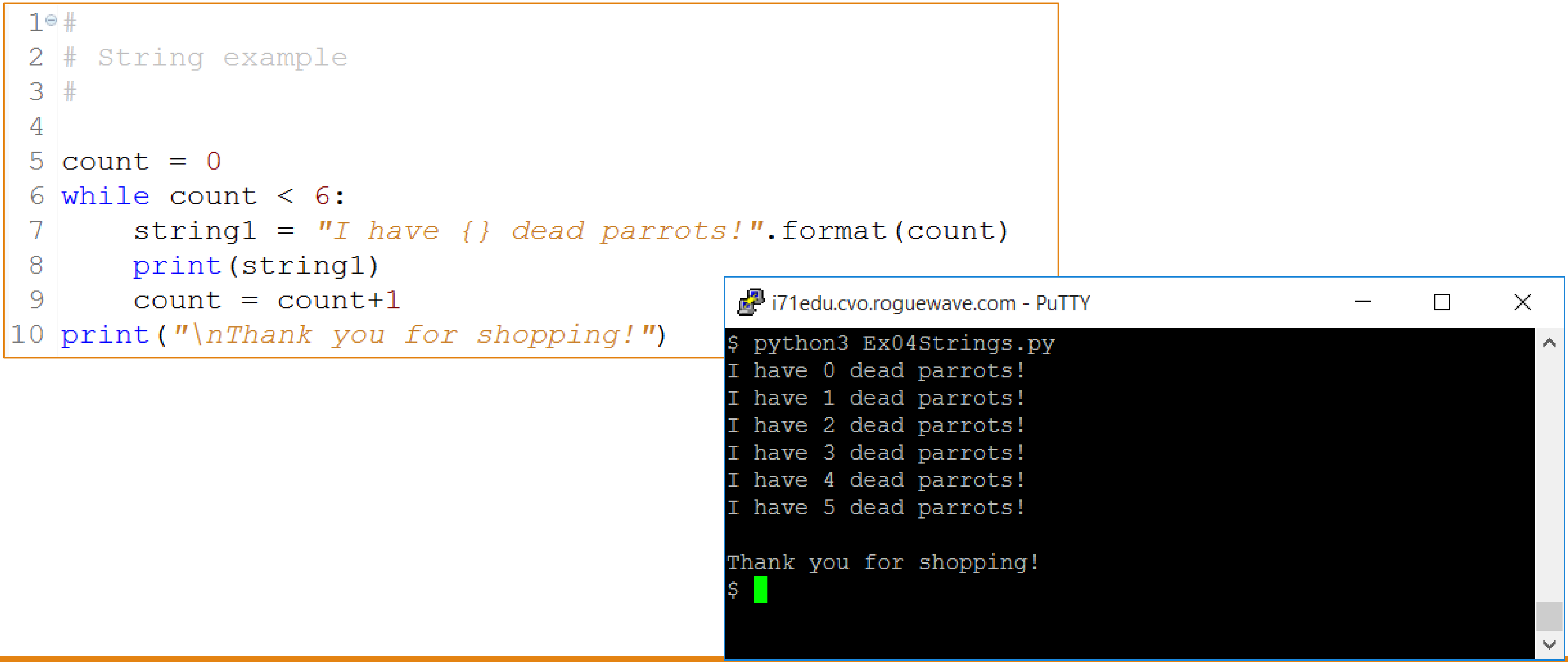
Single or Double quotes, OK (even triple…)

Index starts at 0 (of course…)



String formatting

Interpolation, of sorts



```python
#
# String example
#

count = 0
while count < 6:
    string1 = "I have {} dead parrots!".format(count)
    print(string1)
    count = count+1
print("\nThank you for shopping!")
```

```
$ python3 Ex04Strings.py
I have 0 dead parrots!
I have 1 dead parrots!
I have 2 dead parrots!
I have 3 dead parrots!
I have 4 dead parrots!
I have 5 dead parrots!

Thank you for shopping!
$ 
```

Set Processing

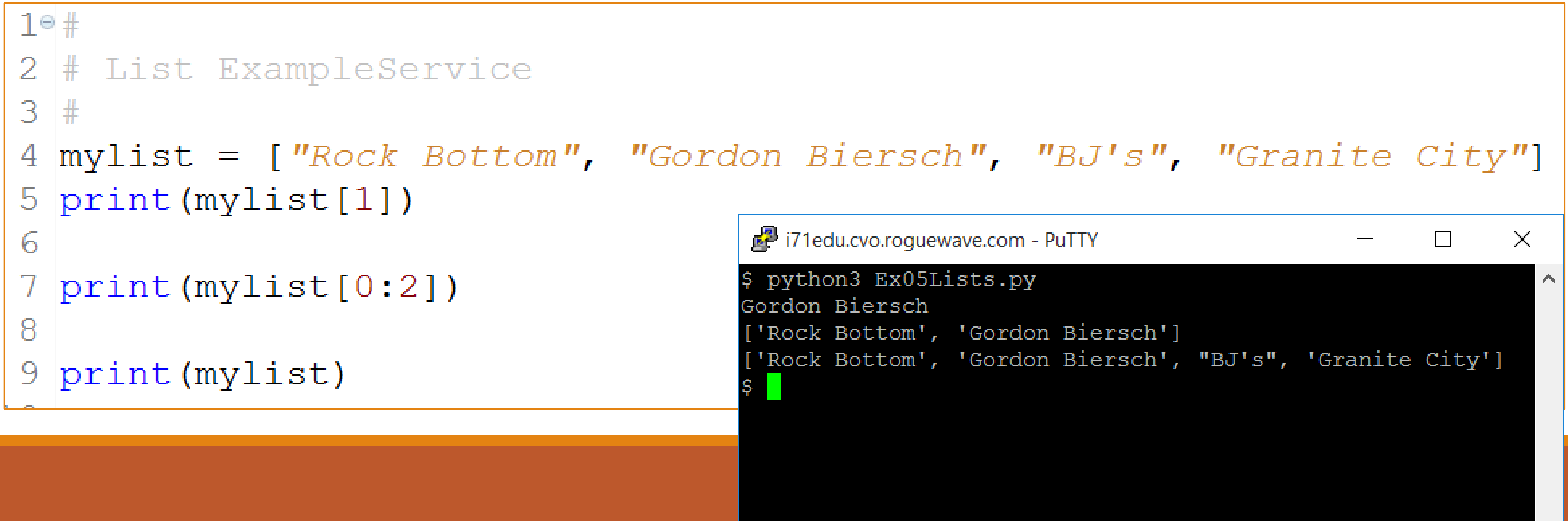
Lists

Ordered group, similar to array

Different data types, ok

Multi-dimensional (sub lists)

Mutable (changeable)



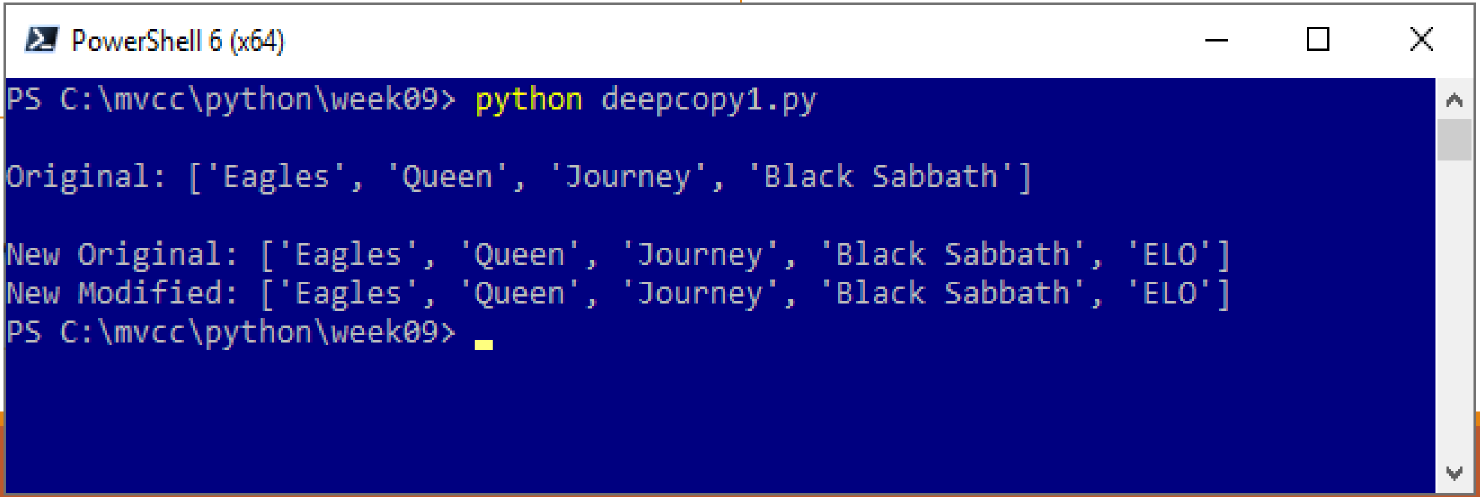
```python
#
# List ExampleService
#
mylist = ["Rock Bottom", "Gordon Biersch", "BJ's", "Granite City"]
print(mylist[1])

print(mylist[0:2])

print(mylist)
```

```
$ python3 Ex05Lists.py
Gordon Biersch
['Rock Bottom', 'Gordon Biersch']
['Rock Bottom', 'Gordon Biersch', "BJ's", 'Granite City']
$
```

List are global and behave like references

```
rockList = ['Eagles', 'Queen', 'Journey', 'Black Sabbath']

myRockList = rockList

print("\nOriginal:", rockList)

myRockList.append("ELO")

print("\nNew Original:", rockList)  #original modified, hmmm...

print("New Modified:", myRockList)
```

Use copy.deepcopy() for pure duplicates



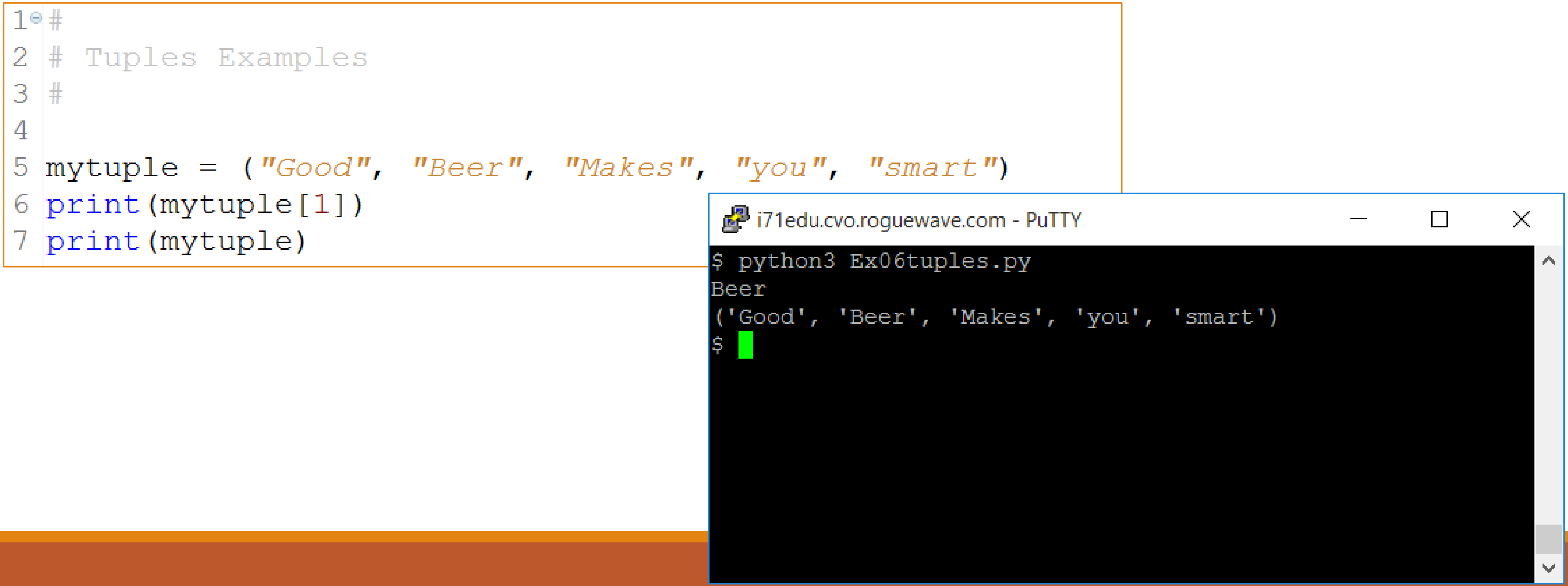
```
PS C:\mvcc\python\week09> python deepcopy1.py

Original: ['Eagles', 'Queen', 'Journey', 'Black Sabbath']

New Original: ['Eagles', 'Queen', 'Journey', 'Black Sabbath', 'ELO']
New Modified: ['Eagles', 'Queen', 'Journey', 'Black Sabbath', 'ELO']
PS C:\mvcc\python\week09>
```

Tuples

Similar to lists

Immutable (don’t change once created)

Use parenthesis instead of brackets



```python
#
# Tuples Examples
#

mytuple = ("Good", "Beer", "Makes", "you", "smart")
print(mytuple[1])
print(mytuple)
```

i71edu.cvo.roguewave.com - PuTTY

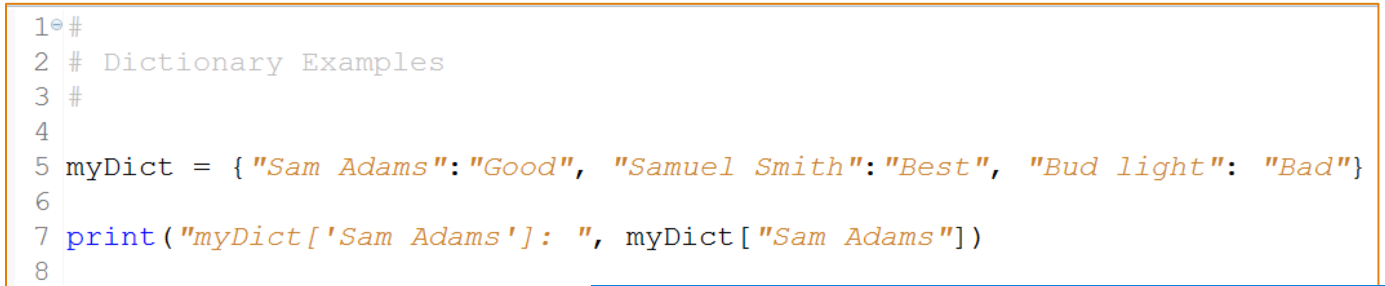
```
$ python3 Ex06tuples.py
Beer
('Good', 'Beer', 'Makes', 'you', 'smart')
$ 
```

Dictionary

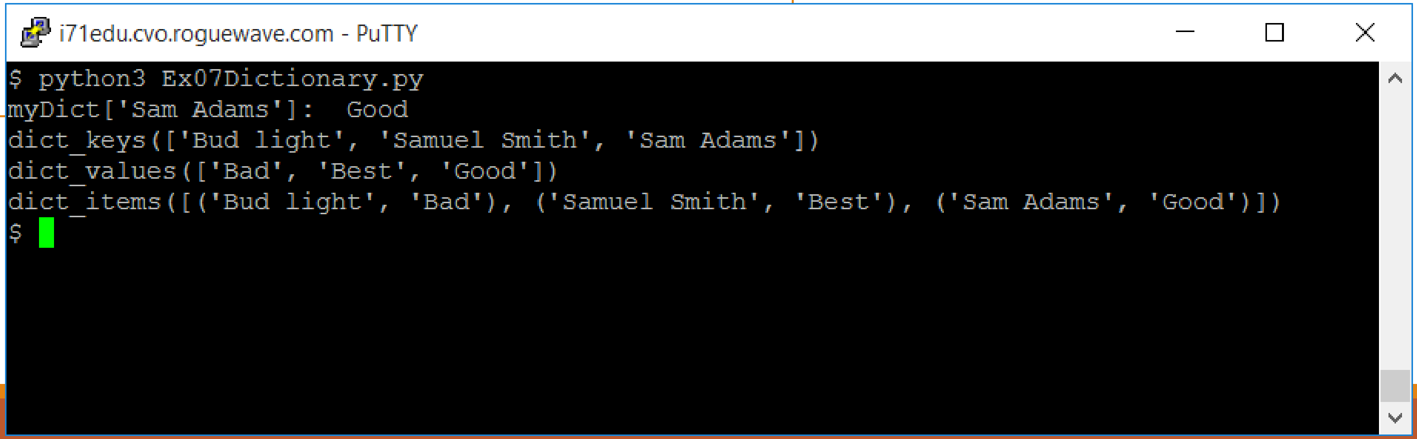
Again, like lists but more like hash or PHP Assoc. Array

Mutable

Key value pairs



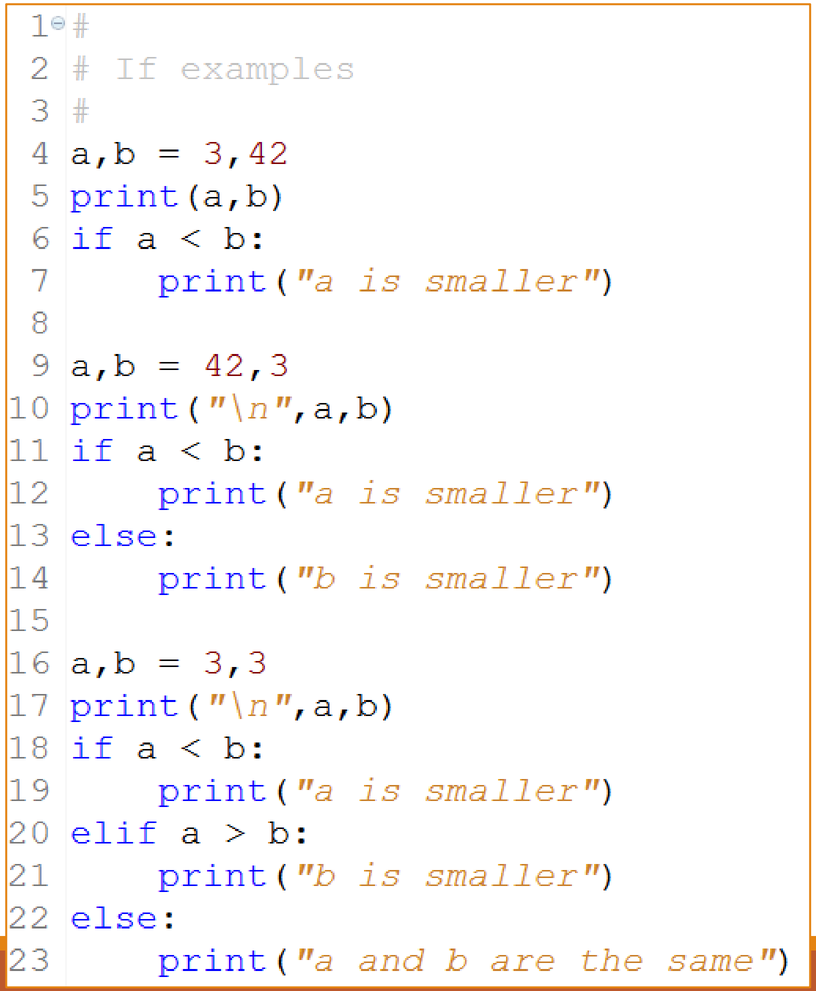
```
#
# Dictionary Examples
#

myDict = {"Sam Adams":"Good", "Samuel Smith":"Best", "Bud light": "Bad"}

print("myDict['Sam Adams']: ", myDict["Sam Adams"])

print(myDict.keys())
print(myDict.values())
print(myDict.items())
```



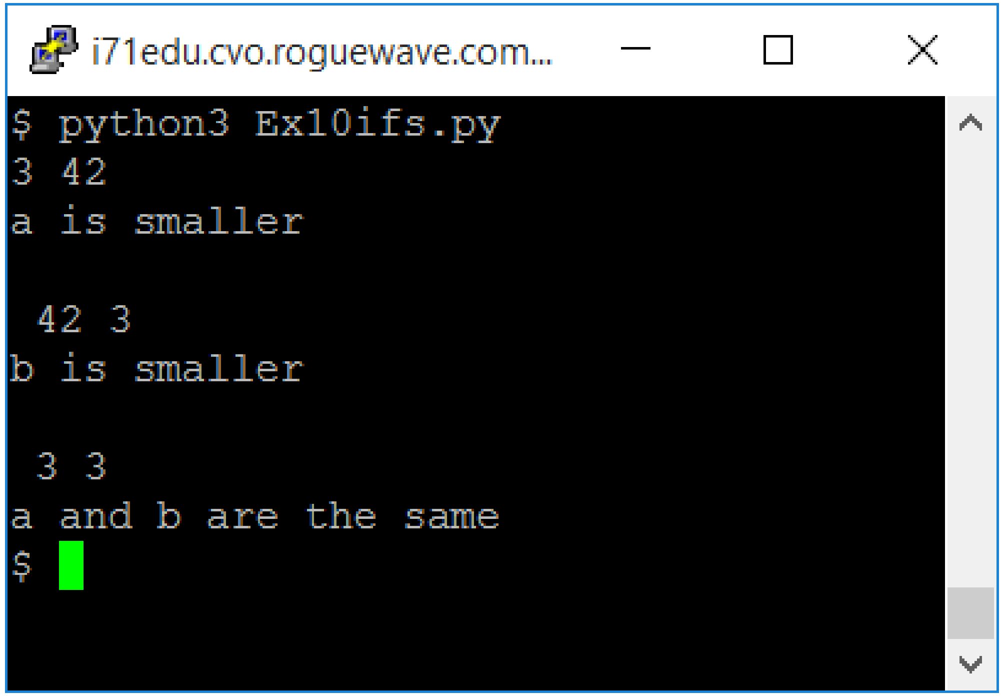
```
$ python3 Ex07Dictionary.py
myDict['Sam Adams']:  Good
dict_keys(['Bud light', 'Samuel Smith', 'Sam Adams'])
dict_values(['Bad', 'Best', 'Good'])
dict_items([('Bud light', 'Bad'), ('Samuel Smith', 'Best'), ('Sam Adams', 'Good')])
$
```

Control Structures

ifs

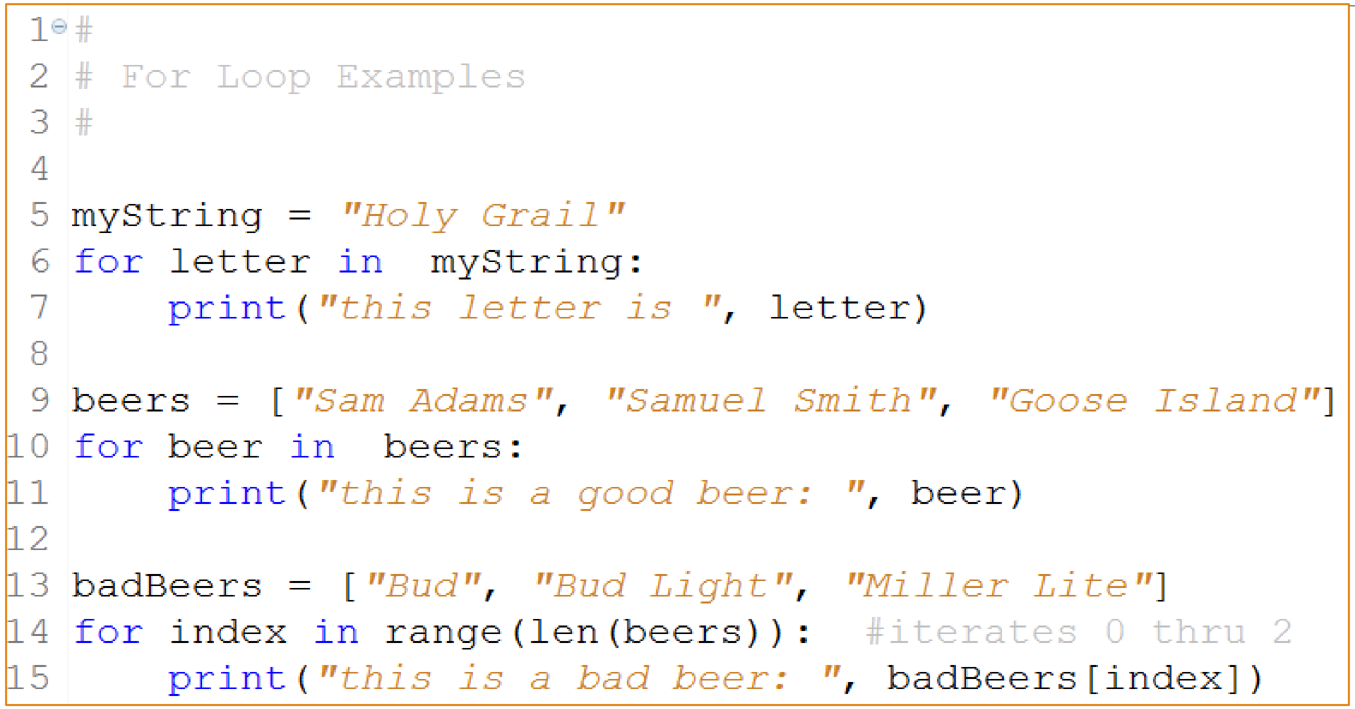


```python
#
# If examples
#
a,b = 3,42
print(a,b)
if a < b:
    print("a is smaller")

a,b = 42,3
print("\n",a,b)
if a < b:
    print("a is smaller")
else:
    print("b is smaller")

a,b = 3,3
print("\n",a,b)
if a < b:
    print("a is smaller")
elif a > b:
    print("b is smaller")
else:
    print("a and b are the same")
```

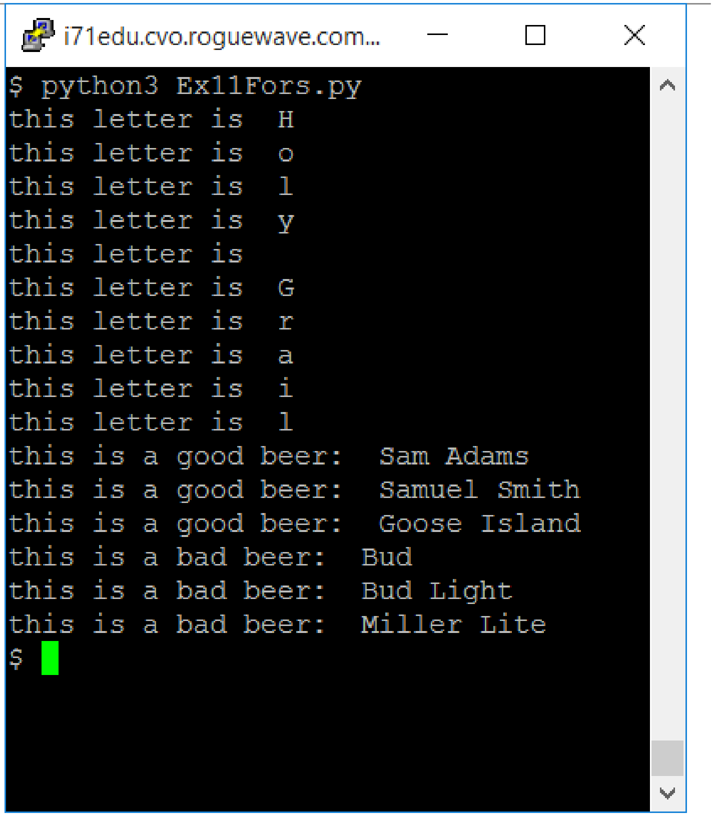


```
$ python3 Ex10ifs.py
3 42
a is smaller

 42 3
b is smaller

 3 3
a and b are the same
$ 
```

for loop

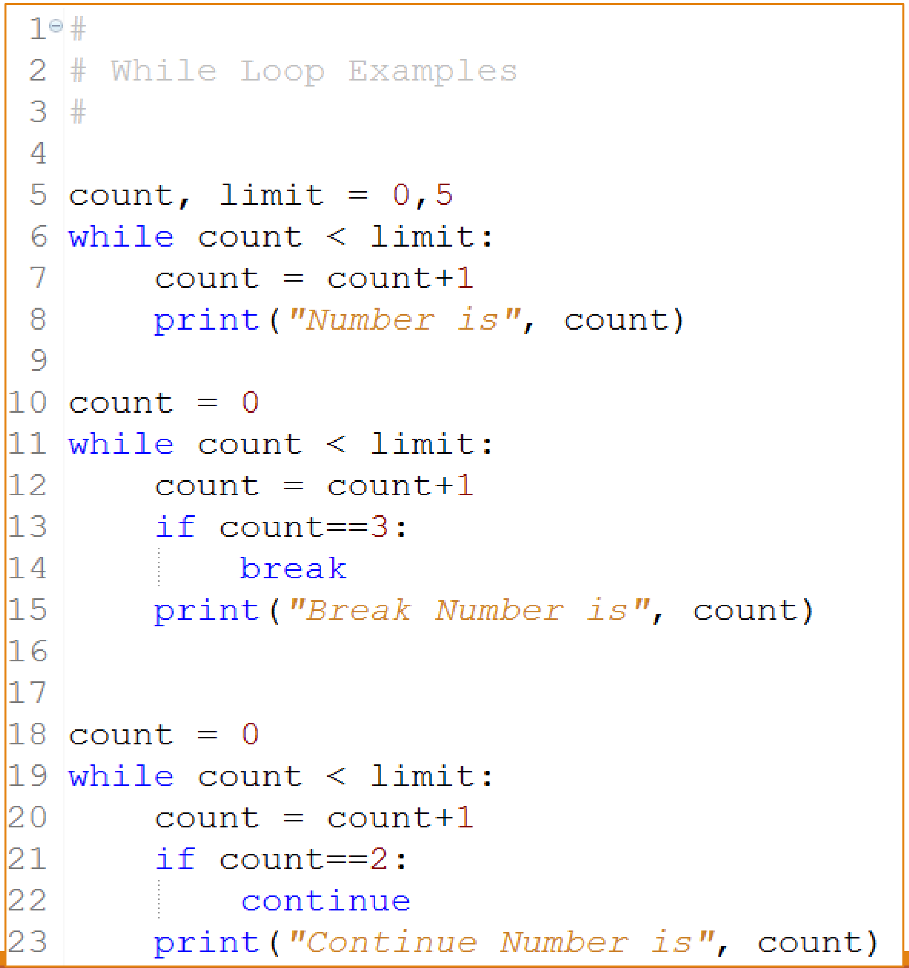


```
#
# For Loop Examples
#

myString = "Holy Grail"
for letter in  myString:
    print("this letter is ", letter)

beers = ["Sam Adams", "Samuel Smith", "Goose Island"]
for beer in  beers:
    print("this is a good beer: ", beer)

badBeers = ["Bud", "Bud Light", "Miller Lite"]
for index in range(len(beers)):  #iterates 0 thru 2
    print("this is a bad beer: ", badBeers[index])
```

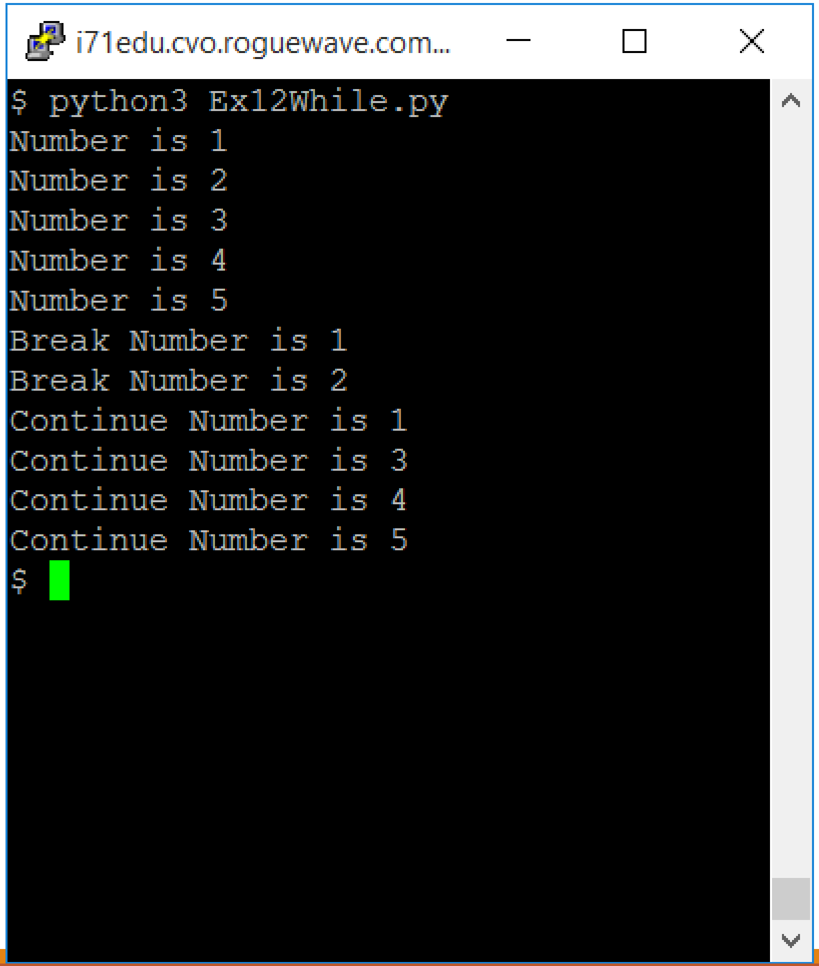


```
$ python3 Ex11Fors.py
this letter is  H
this letter is  o
this letter is  l
this letter is  y
this letter is
this letter is  G
this letter is  r
this letter is  a
this letter is  i
this letter is  l
this is a good beer:  Sam Adams
this is a good beer:  Samuel Smith
this is a good beer:  Goose Island
this is a bad beer:  Bud
this is a bad beer:  Bud Light
this is a bad beer:  Miller Lite
$
```

while loop



```python
#
# While Loop Examples
#

count, limit = 0,5
while count < limit:
    count = count+1
    print("Number is", count)

count = 0
while count < limit:
    count = count+1
    if count==3:
        break
    print("Break Number is", count)


count = 0
while count < limit:
    count = count+1
    if count==2:
        continue
    print("Continue Number is", count)
```

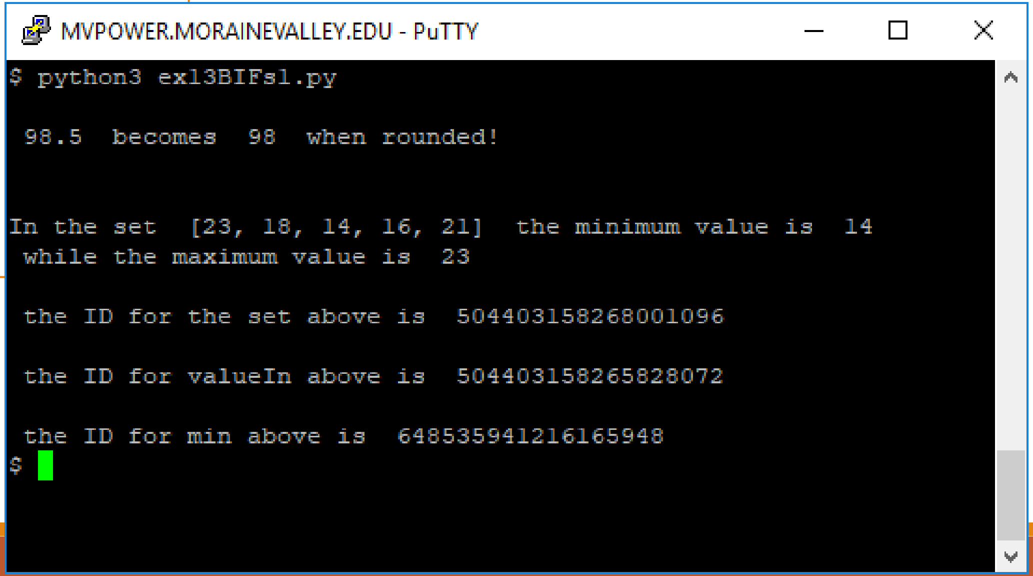


```
$ python3 Ex12While.py
Number is 1
Number is 2
Number is 3
Number is 4
Number is 5
Break Number is 1
Break Number is 2
Continue Number is 1
Continue Number is 3
Continue Number is 4
Continue Number is 5
$ 
```

Functions

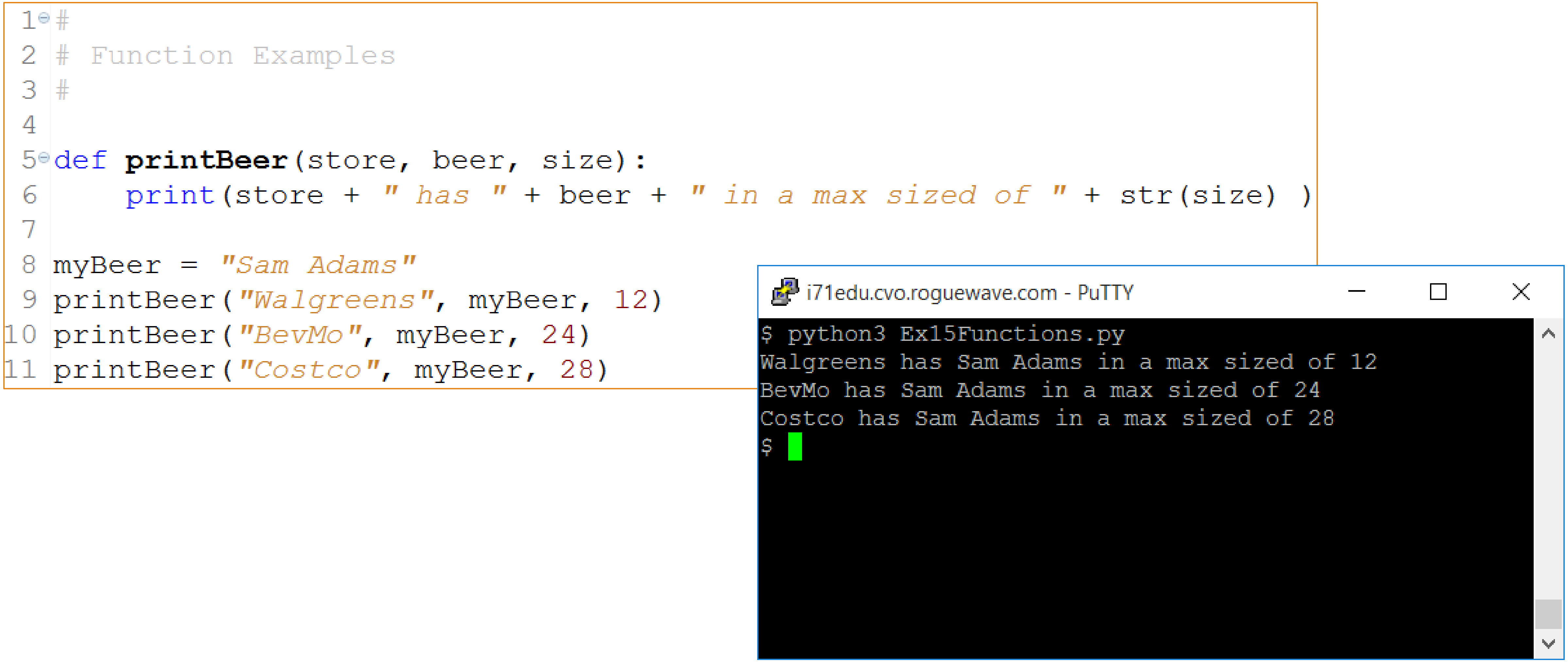
Built in’s are straight forward

```
#rounding...
valueIn = 98.5
valueOut = round(valueIn)
print("\n", valueIn, " becomes ", valueOut, " when rounded!\n")

#set processing
MySet1 = [23, 18, 14, 16, 21]
minset = min(MySet1)
print("\nIn the set ", MySet1, " the minimum value is ", minset)
print(" while the maximum value is ", max(MySet1))

#How about that object ID?
print("\n the ID for the set above is ", id(MySet1))
print("\n the ID for valueIn above is ", id(valueIn))
print("\n the ID for min above is ", id(minset))
```



```
$ python3 ex13BIFs1.py

 98.5  becomes  98  when rounded!


In the set  [23, 18, 14, 16, 21]  the minimum value is  14
 while the maximum value is  23

 the ID for the set above is  504403158268001096

 the ID for valueIn above is  504403158265828072

 the ID for min above is  648535941216165948
$
```

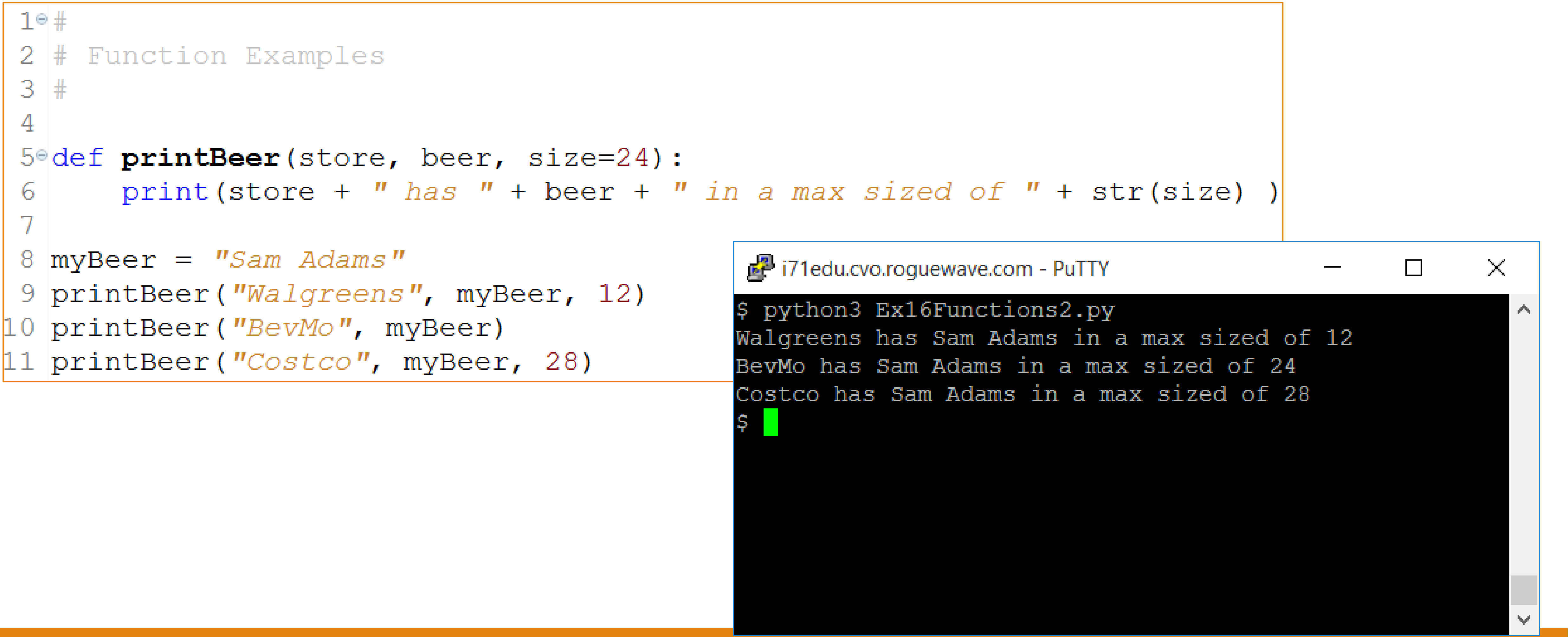
User Defined Functions



```
#
# Function Examples
#

def printBeer(store, beer, size):
    print(store + " has " + beer + " in a max sized of " + str(size) )

myBeer = "Sam Adams"
printBeer("Walgreens", myBeer, 12)
printBeer("BevMo", myBeer, 24)
printBeer("Costco", myBeer, 28)
```

```
$ python3 Ex15Functions.py
Walgreens has Sam Adams in a max sized of 12
BevMo has Sam Adams in a max sized of 24
Costco has Sam Adams in a max sized of 28
$
```

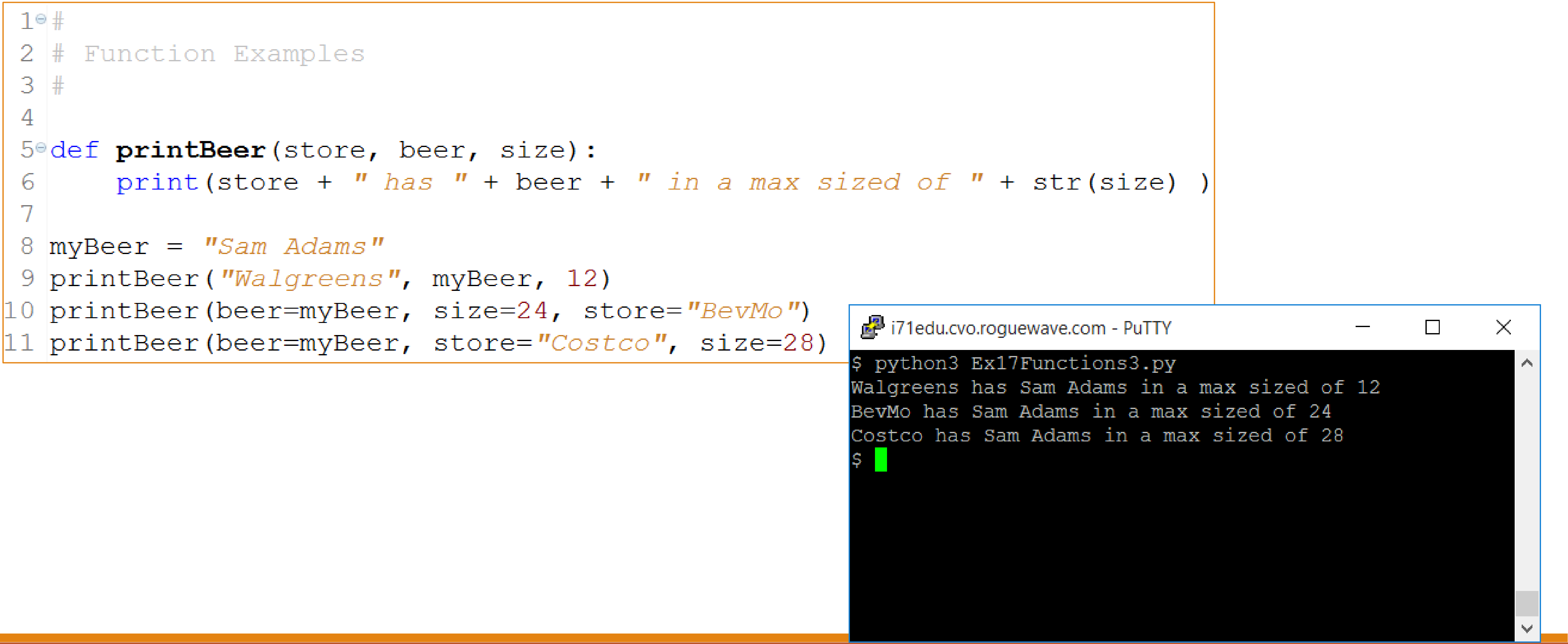
Functions with defaults



```python
#
# Function Examples
#

def printBeer(store, beer, size=24):
    print(store + " has " + beer + " in a max sized of " + str(size) )

myBeer = "Sam Adams"
printBeer("Walgreens", myBeer, 12)
printBeer("BevMo", myBeer)
printBeer("Costco", myBeer, 28)
```

```
$ python3 Ex16Functions2.py
Walgreens has Sam Adams in a max sized of 12
BevMo has Sam Adams in a max sized of 24
Costco has Sam Adams in a max sized of 28
$
```

Functions with Keyword arguments



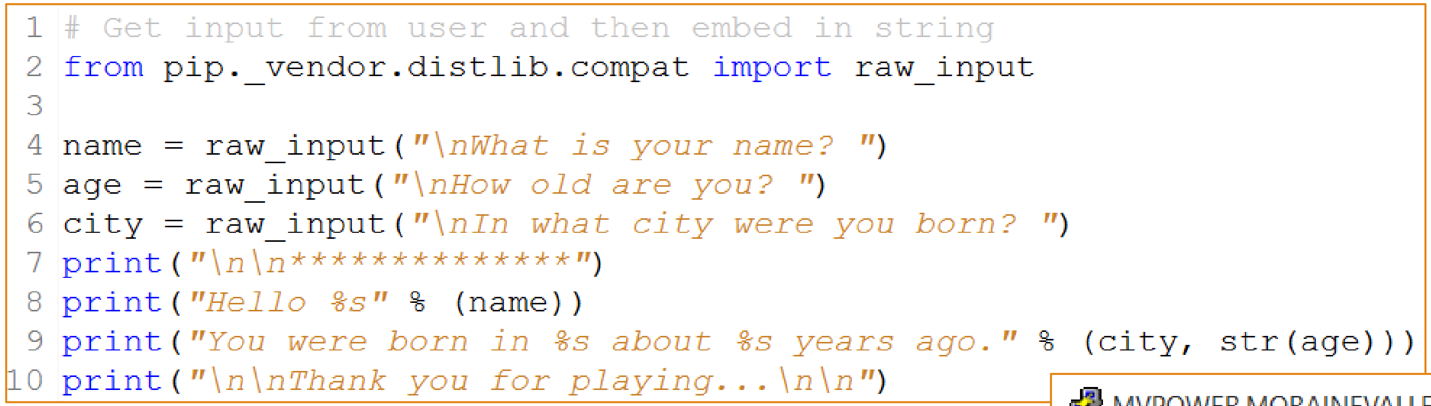
```
#
# Function Examples
#

def printBeer(store, beer, size):
    print(store + " has " + beer + " in a max sized of " + str(size) )

myBeer = "Sam Adams"
printBeer("Walgreens", myBeer, 12)
printBeer(beer=myBeer, size=24, store="BevMo")
printBeer(beer=myBeer, store="Costco", size=28)
```

```
$ python3 Ex17Functions3.py
Walgreens has Sam Adams in a max sized of 12
BevMo has Sam Adams in a max sized of 24
Costco has Sam Adams in a max sized of 28
$ 
```

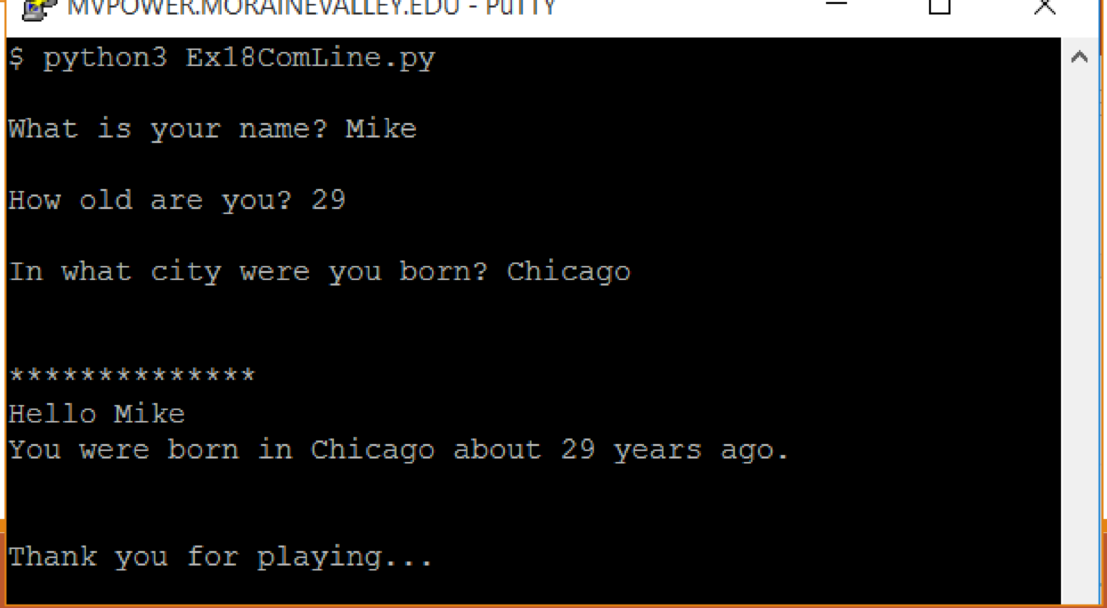
Command Line

Input from command line

"Talk" to the script…Console applications (very popular)



```
# Get input from user and then embed in string
from pip._vendor.distlib.compat import raw_input

name = raw_input("\nWhat is your name? ")
age = raw_input("\nHow old are you? ")
city = raw_input("\nIn what city were you born? ")
print("\n\n**************")
print("Hello %s" % (name))
print("You were born in %s about %s years ago." % (city, str(age)))
print("\n\nThank you for playing...\n\n")
```



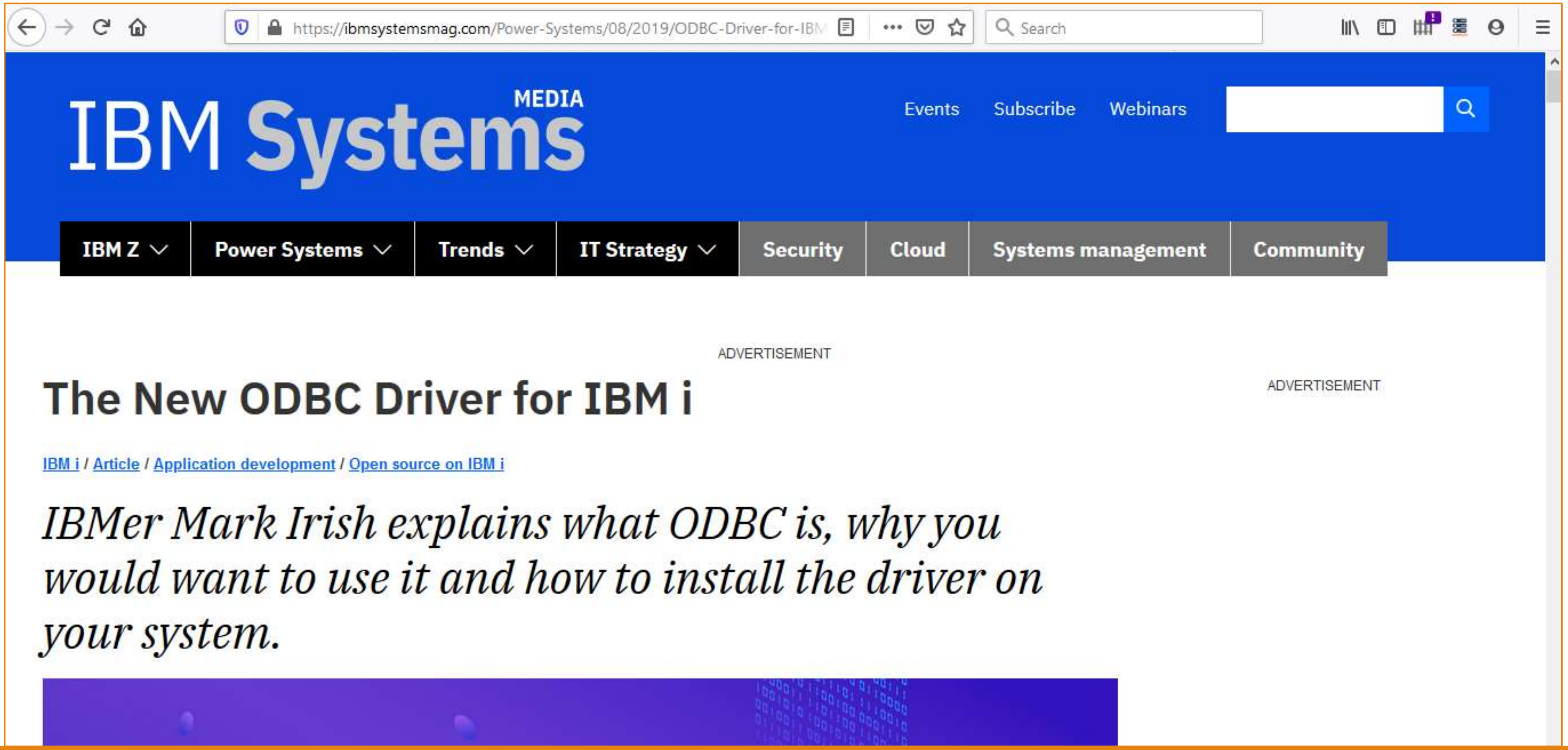
```
$ python3 Ex18ComLine.py

What is your name? Mike

How old are you? 29

In what city were you born? Chicago


**************
Hello Mike
You were born in Chicago about 29 years ago.


Thank you for playing...
```

Database

ODBC is where it's at…

https://ibmsystemsmag.com/Power-Systems/08/2019/ODBC-Driver-for-IBM-i

Read the article by Mark Irish



The New ODBC Driver for IBM i

IBM i / Article / Application development / Open source on IBM i

IBMer Mark Irish explains what ODBC is, why you would want to use it and how to install the driver on your system.

Steps for simple database Access

Import the class

Connect (with or without options)

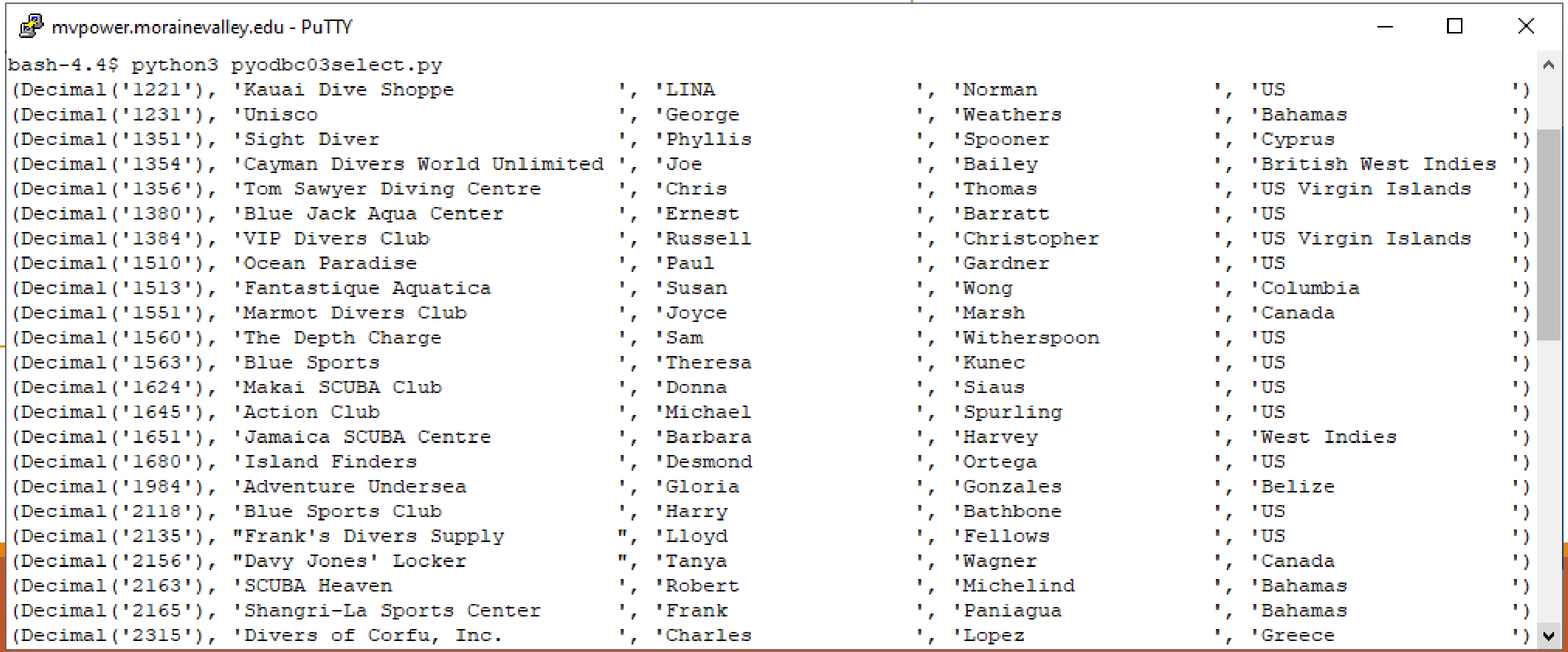
Open the cursor

Set the SQL

Read

Simple script

```python
import pyodbc

cnxn = pyodbc.connect('DSN=*LOCAL')

cursor = cnxn.cursor()

#Sample select query
cursor.execute('''SELECT CUST_ID, COMPANY, FIRSTNAME, LASTNAME, COUNTRY
    from zendphp7.sp_cust''')

row = cursor.fetchone()
while row:
    print(row)
    row = cursor.fetchone()
```

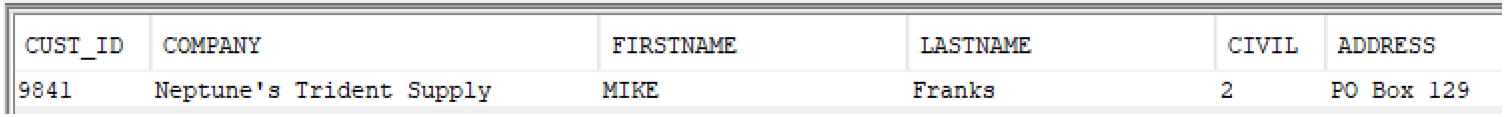


```
bash-4.4$ python3 pyodbc03select.py
(Decimal('1221'), 'Kauai Dive Shoppe             ', 'LINA                ', 'Norman              ', 'US                  ')
(Decimal('1231'), 'Unisco                        ', 'George              ', 'Weathers            ', 'Bahamas             ')
(Decimal('1351'), 'Sight Diver                   ', 'Phyllis             ', 'Spooner             ', 'Cyprus              ')
(Decimal('1354'), 'Cayman Divers World Unlimited ', 'Joe                 ', 'Bailey              ', 'British West Indies ')
(Decimal('1356'), 'Tom Sawyer Diving Centre      ', 'Chris               ', 'Thomas              ', 'US Virgin Islands   ')
(Decimal('1380'), 'Blue Jack Aqua Center         ', 'Ernest              ', 'Barratt             ', 'US                  ')
(Decimal('1384'), 'VIP Divers Club               ', 'Russell             ', 'Christopher         ', 'US Virgin Islands   ')
(Decimal('1510'), 'Ocean Paradise                ', 'Paul                ', 'Gardner             ', 'US                  ')
(Decimal('1513'), 'Fantastique Aquatica          ', 'Susan               ', 'Wong                ', 'Columbia            ')
(Decimal('1551'), 'Marmot Divers Club            ', 'Joyce               ', 'Marsh               ', 'Canada              ')
(Decimal('1560'), 'The Depth Charge              ', 'Sam                 ', 'Witherspoon         ', 'US                  ')
(Decimal('1563'), 'Blue Sports                   ', 'Theresa             ', 'Kunec               ', 'US                  ')
(Decimal('1624'), 'Makai SCUBA Club              ', 'Donna               ', 'Siaus               ', 'US                  ')
(Decimal('1645'), 'Action Club                   ', 'Michael             ', 'Spurling            ', 'US                  ')
(Decimal('1651'), 'Jamaica SCUBA Centre          ', 'Barbara             ', 'Harvey              ', 'West Indies         ')
(Decimal('1680'), 'Island Finders                ', 'Desmond             ', 'Ortega              ', 'US                  ')
(Decimal('1984'), 'Adventure Undersea            ', 'Gloria              ', 'Gonzales            ', 'Belize              ')
(Decimal('2118'), 'Blue Sports Club              ', 'Harry               ', 'Bathbone            ', 'US                  ')
(Decimal('2135'), "Frank's Divers Supply         ", 'Lloyd               ', 'Fellows             ', 'US                  ')
(Decimal('2156'), "Davy Jones' Locker            ", 'Tanya               ', 'Wagner              ', 'Canada              ')
(Decimal('2163'), 'SCUBA Heaven                  ', 'Robert              ', 'Michelind           ', 'Bahamas             ')
(Decimal('2165'), 'Shangri-La Sports Center      ', 'Frank               ', 'Paniagua            ', 'Bahamas             ')
(Decimal('2315'), 'Divers of Corfu, Inc.         ', 'Charles             ', 'Lopez               ', 'Greece              ')
```

For DML type transactions

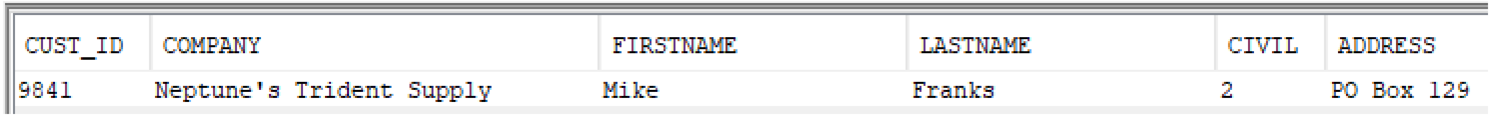
```
import pyodbc

cnxn = pyodbc.connect('DSN=*LOCAL;CommitMode=0')  #Turn off commitment control!

cursor = cnxn.cursor()

#Sample select query
cursor.execute("""update zendphp7.sp_cust
    set FIRSTNAME = 'Mike' where CUST_ID = 9841""")
```

Before:



CUST_ID	COMPANY	FIRSTNAME	LASTNAME	CIVIL	ADDRESS
9841	Neptune's Trident Supply	MIKE	Franks	2	PO Box 129

After:



CUST_ID	COMPANY	FIRSTNAME	LASTNAME	CIVIL	ADDRESS
9841	Neptune's Trident Supply	Mike	Franks	2	PO Box 129

Summary – Why Python

Lot’s of libraries

Make it easy to do stuff

OPC / OPO

Education

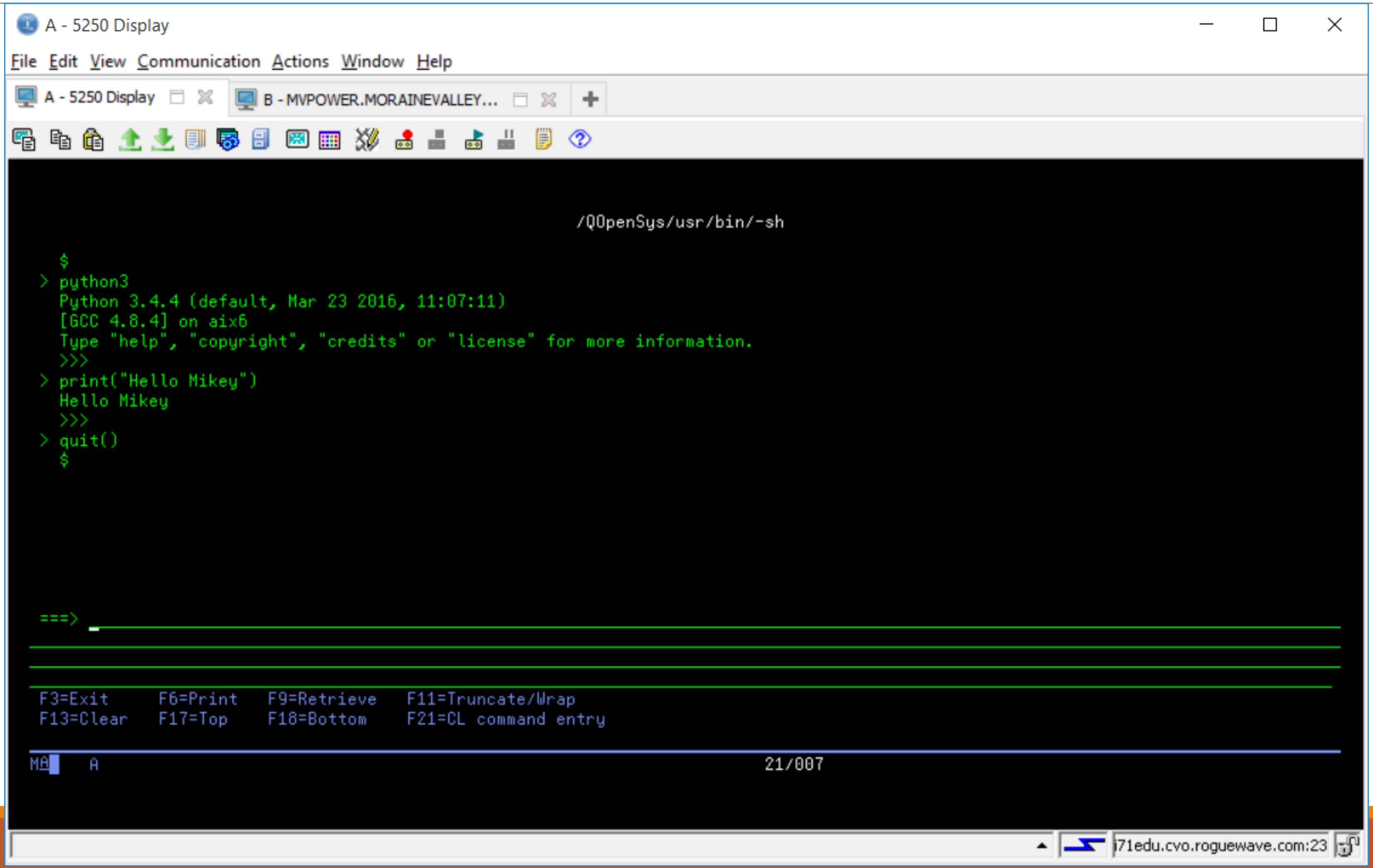
Youth

End the session

Quit()

Exit()

CTRL-D


A - 5250 Display
File Edit View Communication Actions Window Help
A - 5250 Display
B - MVPOWER.MORAINEVALLEY...

```
                                          /QOpenSys/usr/bin/-sh

   $
 > python3
   Python 3.4.4 (default, Mar 23 2016, 11:07:11)
   [GCC 4.8.4] on aix6
   Type "help", "copyright", "credits" or "license" for more information.
   >>>
 > print("Hello Mikey")
   Hello Mikey
   >>>
 > quit()
   $








 ===>


 F3=Exit      F6=Print     F9=Retrieve    F11=Truncate/Wrap
 F13=Clear    F17=Top      F18=Bottom     F21=CL command entry

MA     A                                         21/007
```

i71edu.cvo.roguewave.com:23

Where to get more info and help?

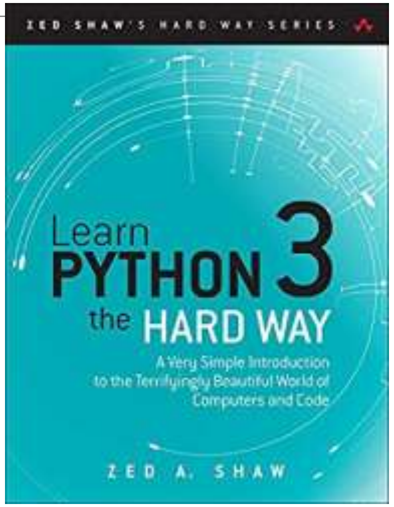
Club Seiden

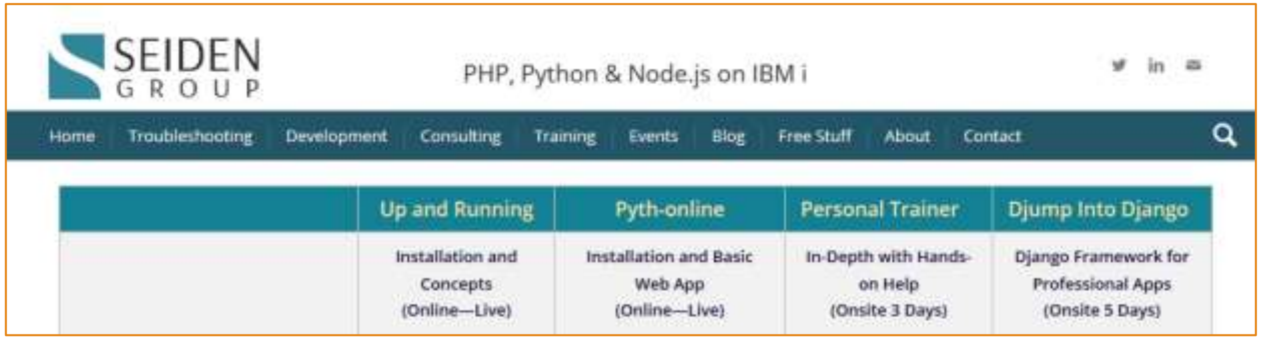
Learn Python 3 The Hard Way

SoloLearn: Learn Python (Android & Apple App)

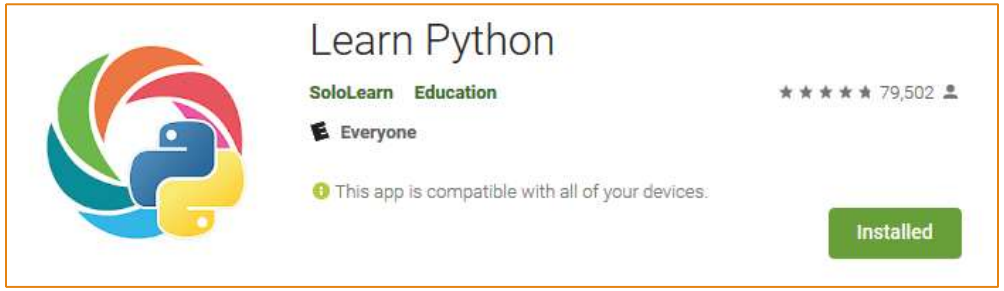
https://ibmioss.ryver.com (send me a note for invite…)

Pythonweekly.com weekly newsletter


ZED SHAW'S HARD WAY SERIES
Learn PYTHON 3 the HARD WAY
A Very Simple Introduction to the Terrifyingly Beautiful World of Computers and Code
ZED A. SHAW



	Up and Running	Pyth-online	Personal Trainer	Djump Into Django
	Installation and Concepts (Online—Live)	Installation and Basic Web App (Online—Live)	In-Depth with Hands-on Help (Onsite 3 Days)	Django Framework for Professional Apps (Onsite 5 Days)



This app is compatible with all of your devices.

Intro to Python for IBM i

MikePavlak@gmail.com

"I AM SPEECHLESS, WITHOUT WORDS, AS SILENT AS A EUROPEAN SPARROW."
THANK YOU. THANK YOU. THANK YOU VERY MUCH.