

GETTING STARTED USING QISKIT

RANDY DOMER



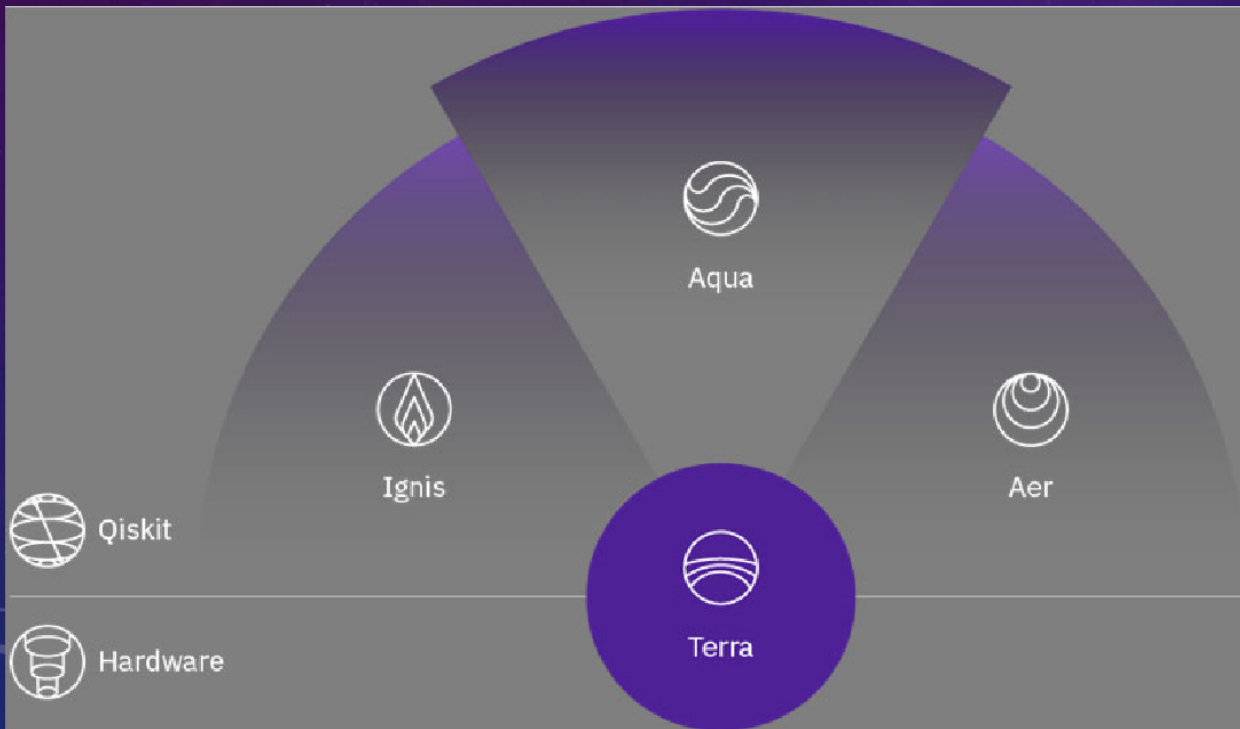
MY BACKGROUND

- Application developers for 30+ Years in the health insurance industry
- Multiple development languages – the usual suspects
- Not an IBM spokesman – very much agnostic

WHAT IS QISKIT?

- Qiskit is IBM implementation of Quantum Computing Platform
- Qiskit is open source
- Written in Python
- Is made up of four different components
- Can use the IBM Quantum Computing Platform

QISKIT = IBM QC PLATFORM



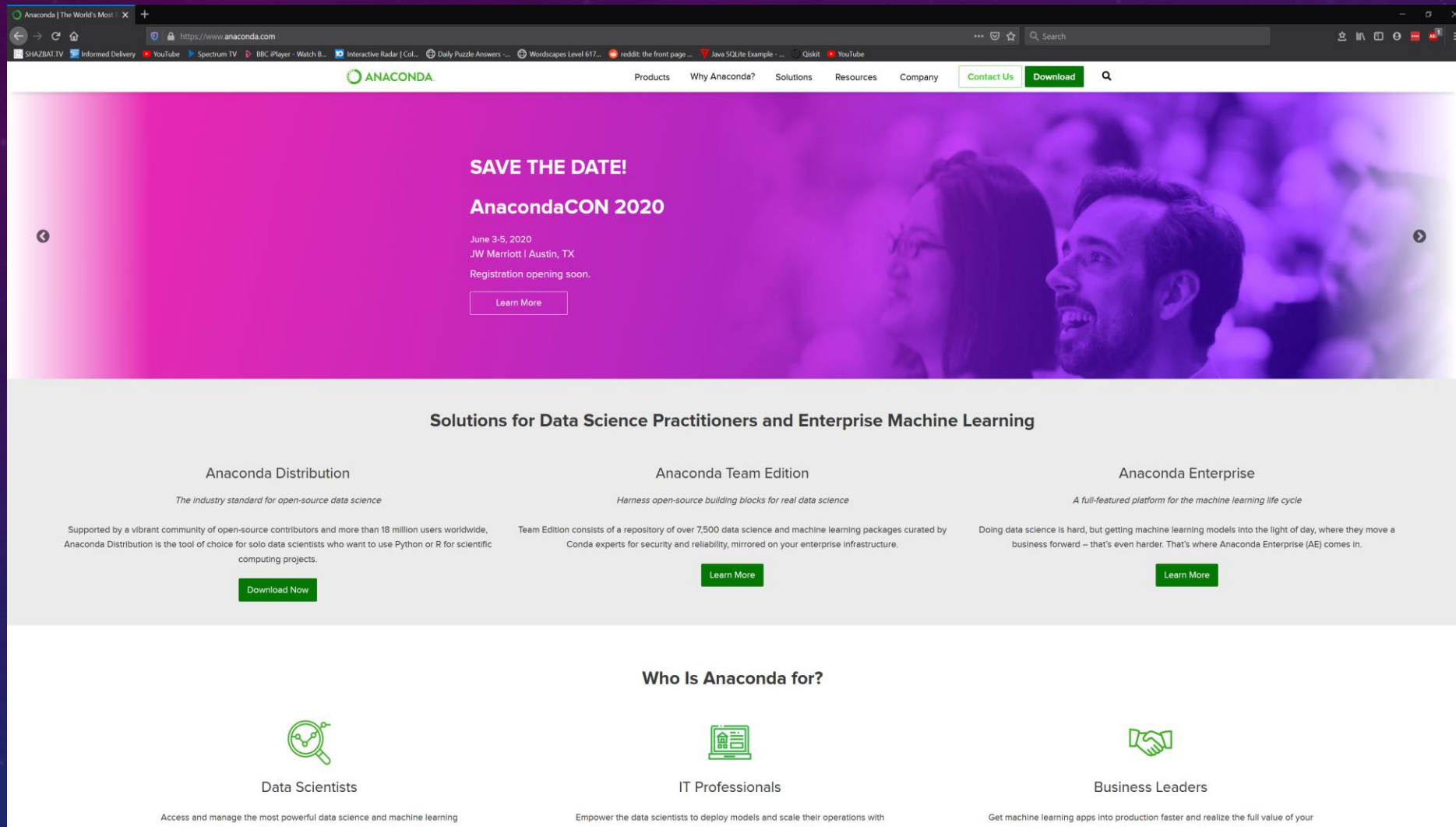
- Terra: Composing programs using circuits and pulses
- Aqua: Building algorithms and applications
- Aer: Simulators, emulators and debugging
- Ignis: Addressing errors and noise

Installing Qiskit

Prerequisites

- Need Python 3.x installed
- Use Anaconda to load python libraries
- Use Juniper Notebooks to test
- Works on all platforms: Windows, Mac and Linux

Install Anaconda



The screenshot shows the Anaconda website homepage. At the top, there's a navigation bar with the Anaconda logo and links for Products, Why Anaconda?, Solutions, Resources, Company, Contact Us, and Download. Below this is a large hero section with a pink-to-purple gradient background. It features the text "SAVE THE DATE! AnacondaCON 2020" and details about the event: "June 3-5, 2020", "JW Marriott | Austin, TX", and "Registration opening soon." with a "Learn More" button. Below the hero section is a section titled "Solutions for Data Science Practitioners and Enterprise Machine Learning". This section is divided into three columns: "Anaconda Distribution" (described as "The industry standard for open-source data science"), "Anaconda Team Edition" (described as "Harness open-source building blocks for real data science"), and "Anaconda Enterprise" (described as "A full-featured platform for the machine learning life cycle"). Each column has a brief description and a "Learn More" button. At the bottom, there's a section titled "Who Is Anaconda for?" with three icons and corresponding text: "Data Scientists" (with a magnifying glass icon), "IT Professionals" (with a server rack icon), and "Business Leaders" (with a handshake icon).

ANAconda

Products Why Anaconda? Solutions Resources Company [Contact Us](#) [Download](#)

SAVE THE DATE!

AnacondaCON 2020

June 3-5, 2020
JW Marriott | Austin, TX
Registration opening soon.

[Learn More](#)

Solutions for Data Science Practitioners and Enterprise Machine Learning

Anaconda Distribution

The industry standard for open-source data science

Supported by a vibrant community of open-source contributors and more than 18 million users worldwide, Anaconda Distribution is the tool of choice for solo data scientists who want to use Python or R for scientific computing projects.

[Download Now](#)

Anaconda Team Edition

Harness open-source building blocks for real data science

Team Edition consists of a repository of over 7,500 data science and machine learning packages curated by Conda experts for security and reliability, mirrored on your enterprise infrastructure.

[Learn More](#)


Anaconda Enterprise

A full-featured platform for the machine learning life cycle

Doing data science is hard, but getting machine learning models into the light of day, where they move a business forward – that's even harder. That's where Anaconda Enterprise (AE) comes in.


[Learn More](#)

Who Is Anaconda for?




Data Scientists

Access and manage the most powerful data science and machine learning



IT Professionals

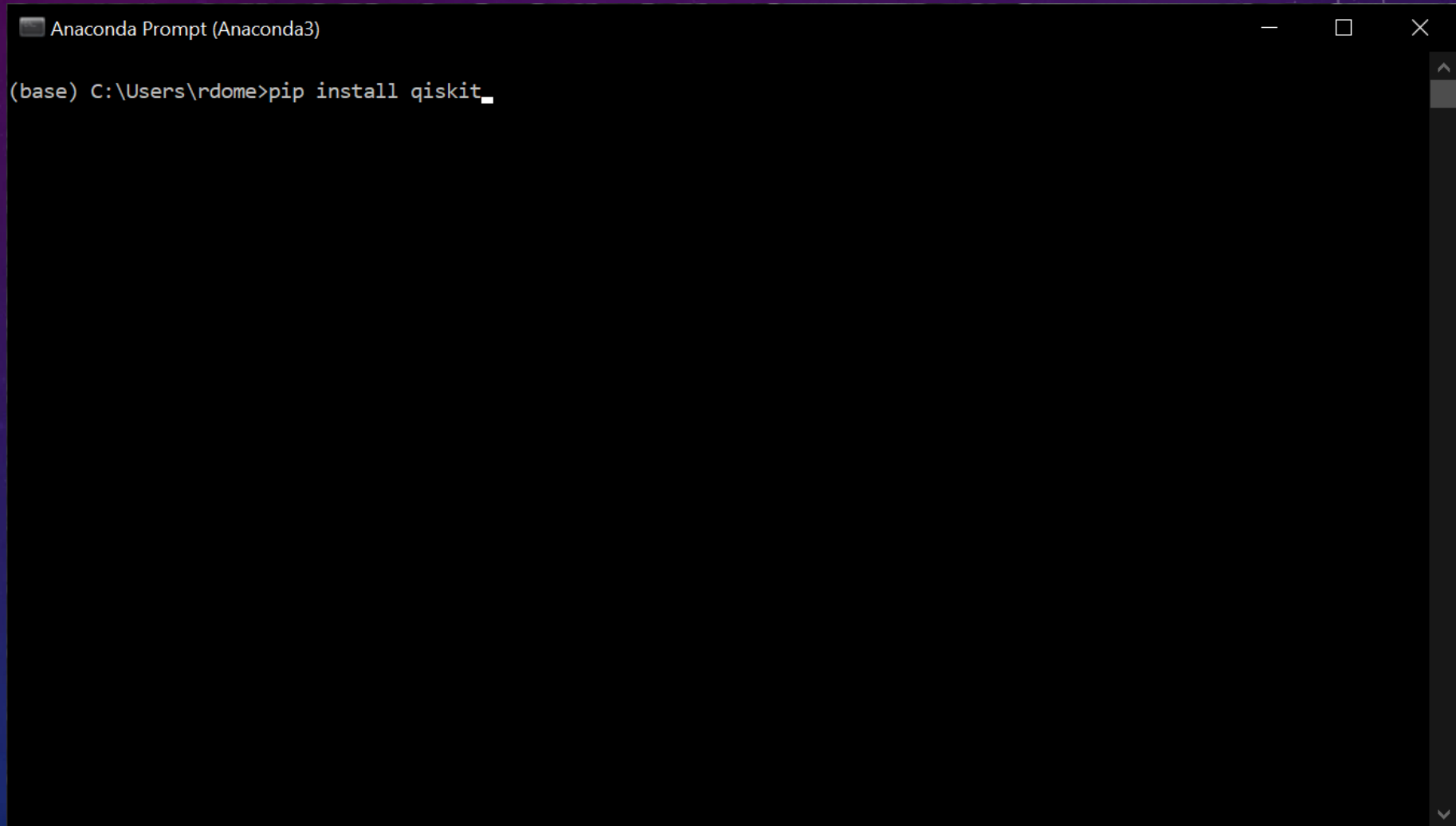
Empower the data scientists to deploy models and scale their operations with



Business Leaders

Get machine learning apps into production faster and realize the full value of your

Install Qiskit

A screenshot of an Anaconda Prompt window. The window title is "Anaconda Prompt (Anaconda3)". The command prompt shows the command `(base) C:\Users\rdome>pip install qiskit_` with a cursor at the end. The background of the slide features a dark blue space-themed pattern with faint, glowing circular lines and star-like specks.

```
Anaconda Prompt (Anaconda3)

(base) C:\Users\rdome>pip install qiskit_
```

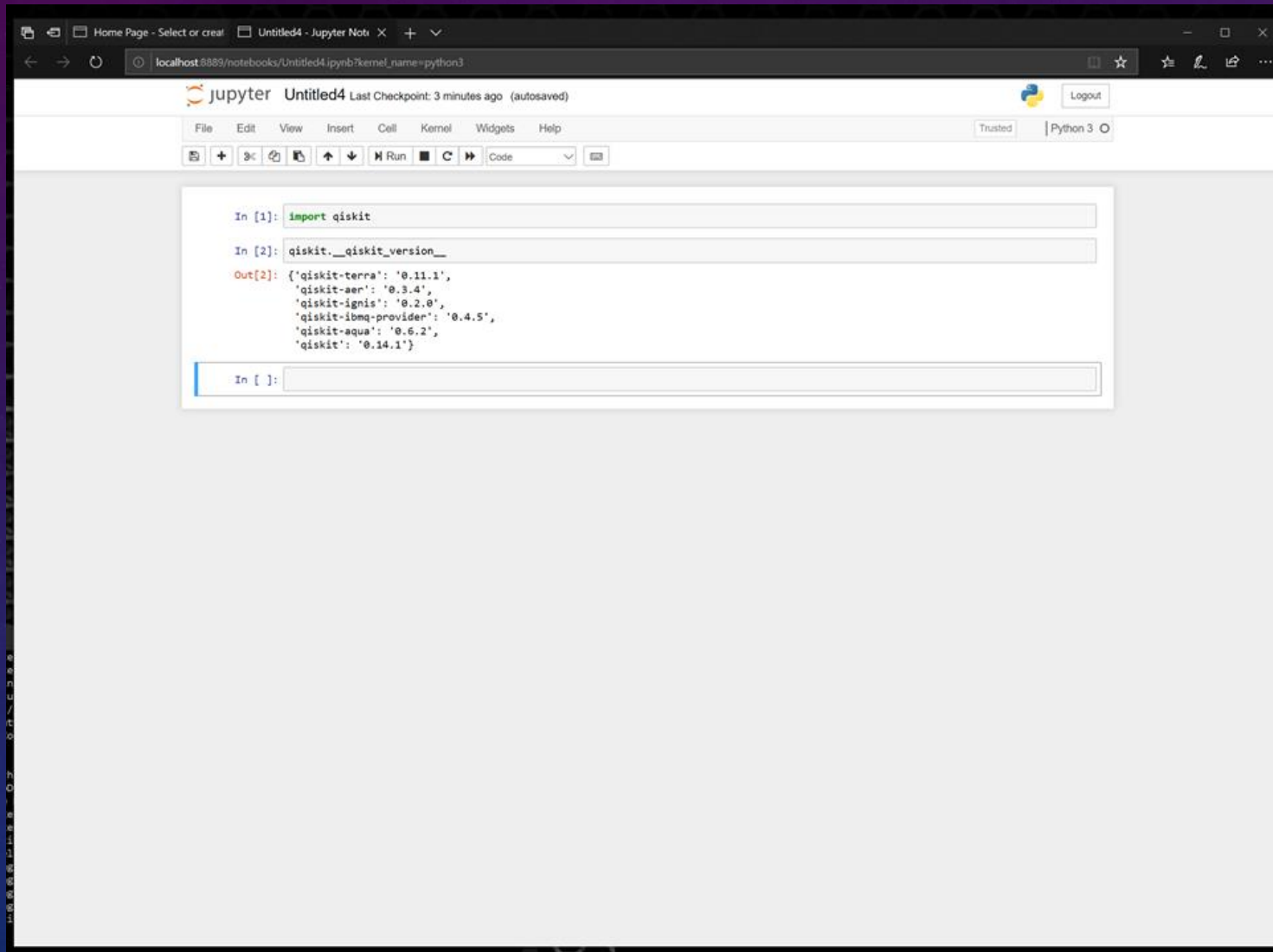
Run Jupyter Notebook

```
Anaconda Prompt (Anaconda3) - jupyter notebook

(base) C:\Users\rdome>jupyter notebook
[I 14:21:40.949 NotebookApp] JupyterLab extension loaded from C:\ProgramData\Anaconda3\lib\site-packages\jupyterlab
[I 14:21:40.949 NotebookApp] JupyterLab application directory is C:\ProgramData\Anaconda3\share\jupyter\lab
[I 14:21:40.953 NotebookApp] Serving notebooks from local directory: C:\Users\rdome
[I 14:21:40.953 NotebookApp] The Jupyter Notebook is running at:
[I 14:21:40.953 NotebookApp] http://localhost:8888/?token=4119cbcd51daf9829076c76bcecf6de78f06021edfa4137c
[I 14:21:40.953 NotebookApp] or http://127.0.0.1:8888/?token=4119cbcd51daf9829076c76bcecf6de78f06021edfa4137c
[I 14:21:40.953 NotebookApp] Use Control-C to stop this server and shut down all kernels (twice to skip confirmation).
[C 14:21:40.999 NotebookApp]

To access the notebook, open this file in a browser:
    file:///C:/Users/rdome/AppData/Roaming/jupyter/runtime/nbserver-4816-open.html
Or copy and paste one of these URLs:
    http://localhost:8888/?token=4119cbcd51daf9829076c76bcecf6de78f06021edfa4137c
    or http://127.0.0.1:8888/?token=4119cbcd51daf9829076c76bcecf6de78f06021edfa4137c
```


Test Qiskit install and check version



The screenshot shows a Jupyter Notebook titled 'Untitled4' running on a local host. The notebook contains two input cells. The first cell contains the code `import qiskit`. The second cell contains the code `qiskit.__qiskit_version__`. The output of the second cell is a dictionary showing the versions of various Qiskit components: 'qiskit-terra': '0.11.1', 'qiskit-aer': '0.3.4', 'qiskit-ignis': '0.2.0', 'qiskit-ibmq-provider': '0.4.5', 'qiskit-aqua': '0.6.2', and 'qiskit': '0.14.1'.

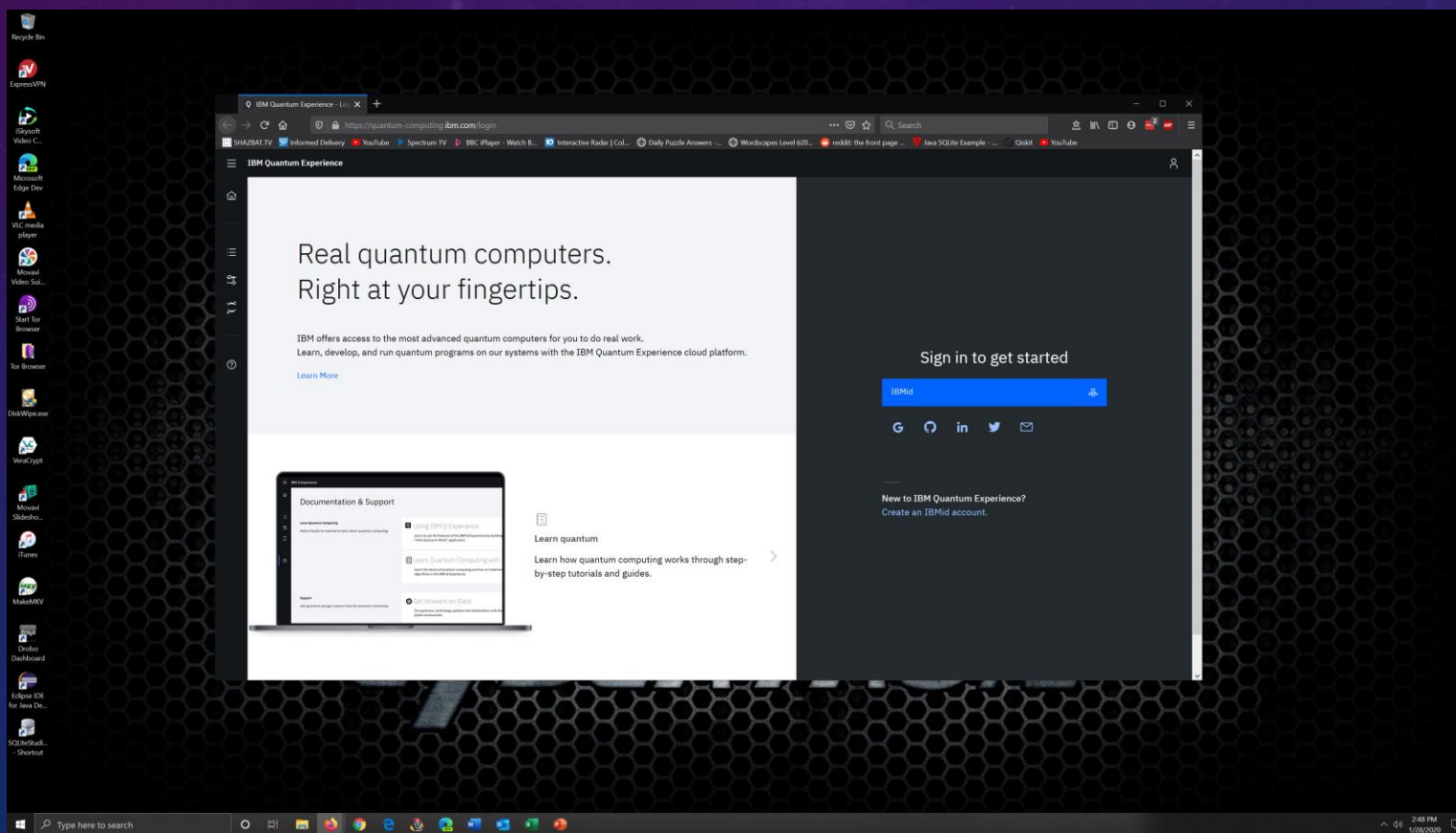
```
In [1]: import qiskit

In [2]: qiskit.__qiskit_version__
Out[2]: {'qiskit-terra': '0.11.1',
        'qiskit-aer': '0.3.4',
        'qiskit-ignis': '0.2.0',
        'qiskit-ibmq-provider': '0.4.5',
        'qiskit-aqua': '0.6.2',
        'qiskit': '0.14.1'}
```

```
In [ ]:
```

Now register with IBM Quantum Experience

If you need to register with IBM Quantum Experience to run your program on an actual Quantum Computer **<https://quantum-computing.ibm.com/login>**



Once you have registered with IBM Quantum you will need to request a token

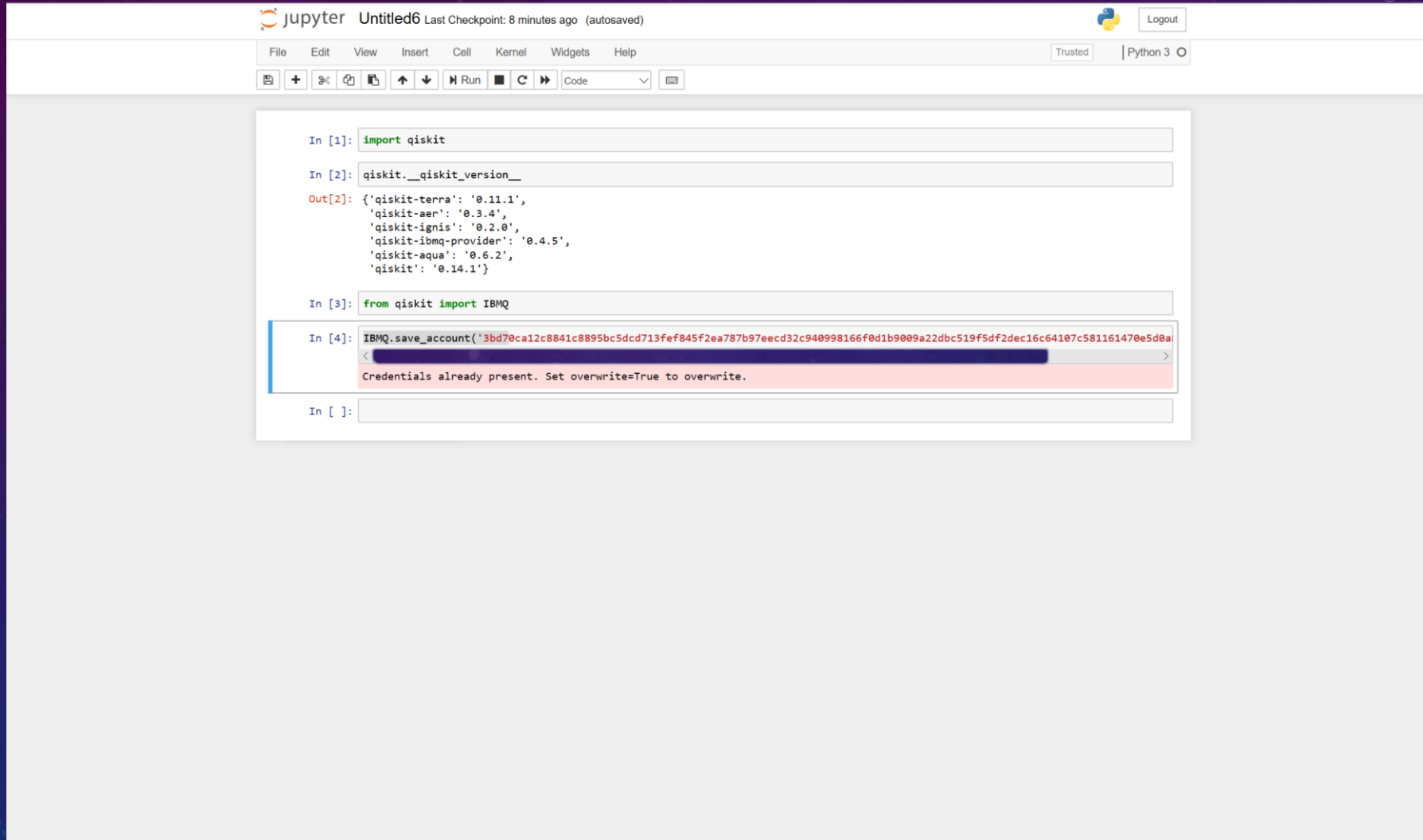
The screenshot shows the IBM Quantum Experience account page. The browser address bar displays `https://quantum-computing.ibm.com/account`. The page is divided into several sections:

- Account Details:** Username `rdomer2010`, Email `rdomer@gmail.com`, and a "None" profile picture. Links for "Edit", "Privacy & security", "IBM Quantum End User Agreement", and "Delete account" are provided.
- Qiskit in IBM Quantum Experience:** Includes instructions: "No setup required" and "Create Qiskit notebook [here](#)".
- Qiskit in local environment:** Lists steps: "1. Install Qiskit" and "2. Follow the instructions to access the IBM Quantum services from Qiskit, this is your API Token:". Below this is a box with a masked token (*****), a "Copy token" button (highlighted in blue), and a "Regenerate" button.
- Notification Settings:** Includes a section for "Updates and new feature announcements" (Email: On) and "Surveys to help improve IBM Quantum Experience" (Email: Off). There is also a toggle for "In tool" (Off).
- Your providers:** A table listing available providers.

Your providers		
IBM Q ibmq-q	open Details Joined 05-05-2019	Allocated backends ibmq_qasm_simulator ibmq_16_melbourne ibmq_ourense ibmqx2 ibmq_vigo ibmq_london ibmq_burlington ibmq_essex

```
IBMQ.get_provider(hub='ibmq-q', group='open', project='main')
```

Load Token into your Qiskit

A screenshot of a Jupyter Notebook interface. The top bar shows 'jupyter' logo, 'Untitled6', and 'Last Checkpoint: 8 minutes ago (autosaved)'. On the right, there is a 'Logout' button and a 'Python 3' kernel indicator. The menu bar includes 'File', 'Edit', 'View', 'Insert', 'Cell', 'Kernel', 'Widgets', and 'Help'. Below the menu is a toolbar with icons for file operations and code execution. The notebook area contains four input cells. The first cell has the code 'import qiskit'. The second cell has the code 'qiskit.__qiskit_version__'. The third cell has the code 'from qiskit import IBMQ'. The fourth cell has the code 'IBMQ.save_account('3bd70ca12c8841c8895bc5dcd713fef845f2ea787b97eecd32c940998166f0d1b9009a22dbc519f5df2dec16c64107c581161470e5d0a...')'. The output of the fourth cell is a red error message: 'Credentials already present. Set overwrite=True to overwrite.'

```
jupyter Untitled6 Last Checkpoint: 8 minutes ago (autosaved)
File Edit View Insert Cell Kernel Widgets Help Trusted | Python 3

In [1]: import qiskit

In [2]: qiskit.__qiskit_version__
Out[2]: {'qiskit-terra': '0.11.1',
        'qiskit-aer': '0.3.4',
        'qiskit-ignis': '0.2.0',
        'qiskit-ibmq-provider': '0.4.5',
        'qiskit-aqua': '0.6.2',
        'qiskit': '0.14.1'}

In [3]: from qiskit import IBMQ

In [4]: IBMQ.save_account('3bd70ca12c8841c8895bc5dcd713fef845f2ea787b97eecd32c940998166f0d1b9009a22dbc519f5df2dec16c64107c581161470e5d0a...')
Out[4]: Credentials already present. Set overwrite=True to overwrite.

In [ ]:
```


Congratulations – you are ready to take the next step

New Textbook on Qiskit: <https://qiskit.org/textbook/preface.html>

Hello World Tutorial: <https://www.youtube.com/watch?v=RrUTwq5jKM4>

IBM has a great series of YouTube videos on how to create programs

There is several quantum games being developed!