

## Welcome to BayesForge



真金不怕火炼

“True gold is not afraid of fire.”

(Chinese Proverb)

*“Incus robust malleum non timet”*

“A strong anvil need not fear the hammer.”

(Latin Proverb)

- [www.Bayesforge.com](http://www.Bayesforge.com)
- Discourse Forum at <http://discourse.bayesforge.com>

# BayesForge Entrance

The screenshot shows a web browser window displaying the JupyterLab interface. The browser's address bar shows the URL `https://ec2-34-209-195-216.us-west-2.compute.a`. The JupyterLab header includes the 'jupyter' logo and a 'Logout' button. Below the header, there are tabs for 'Files', 'Running', 'Clusters', and 'Nbextensions'. The 'Files' tab is active, showing a file browser with the instruction 'Select items to perform actions on them.' and buttons for 'Upload', 'New', and a refresh icon. The file browser lists several items: a home icon, a folder named 'Classical', a folder named 'Quantum', a folder named 'Utilities', and a file named 'README.ipynb'. A 'New' dropdown menu is open, and the 'Notebooks' option is circled in red. The menu also includes 'Text File', 'Folder', 'Terminal', 'Bash', 'Octave', 'Python (IBMQIS)', 'Python 2', 'Python 3', and 'R'.

## What is BayesForge (BF)?

- Your cloud hosted, free (for limited use, if free tier is available), personal file system and development environment for classical and quantum AI software development
- [BayesForge.com](https://bayesforge.com) (BF) is a docker image that provides each user a personal file system with buttons to start, edit, run, save Jupyter notebooks of various kinds (Bash, Python 3, R and Octave== an open source Matlab clone). BF also allows you to store other types of files, like txt, py, jpg, etc. BF comes preloaded with an extensive collection of open source software, including Anaconda, most of the R distribution, Tensorflow, etc.
- The entrance directory of BF contains 3 folders: Classical, Quantum and Utilities. The Classical folder contains software for doing classical AI (e.g., Tensorflow/Edward, pymc3, bnlearn) and the Quantum folder contains a large collection of the most popular quantum software by IBM, Google, Rigetti, etc.
- Users can install or remove modules.
- Authentication by password or key pair is supported

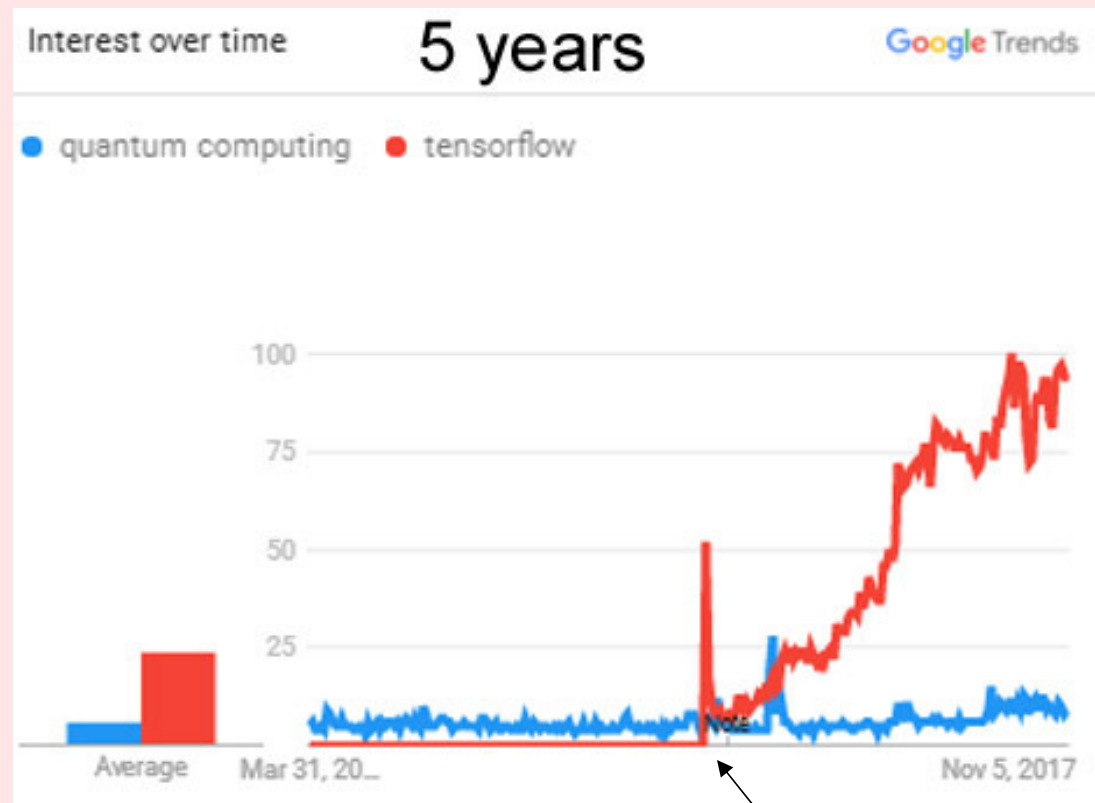
## Classical & Quantum Open Source

BF is a huge collection of Open Source Software.  
The Anaconda and Red Hat of quantum computing,



From  
Classic  
1984  
Apple adv.

## Result of GoogleTrends search for keywords “TensorFlow” and “Quantum Computing”



TensorFlow Released as Open-Source

## Use BF to Develop Classical, Quantum or Hybrid AI Software



← Feynman  
quote

- TensorFlow
- Edward (Google's Probabilistic enhancement of Tensorflow)
- Quantum Edward (product of artiste-qb.net) Gave Meetup Talk about it: <https://www.meetup.com/Quantum-Computing-and-Big-Data/events/251342267/>

## Quantum Ready

Quantum

Classical



## Wide Tent 1/2

BF includes software tools of many companies and often allows internet access to their hardware.

### EXAMPLES OF WIDE TENT:

1. With BF, you can run/manage Jupyter notebooks in Bash, Python, R, Octave == open source Matlab clone. Within Jupyter notebook, you can combine R and Python using “R magic”
2. With BF, you can write quantum software for Gate Model or Annealer qc. For Annealer qc, BF includes software by D Wave and Fujitsu(not yet). For Gate Model qc, BF includes software by IBM, Google, Rigetti, etc.

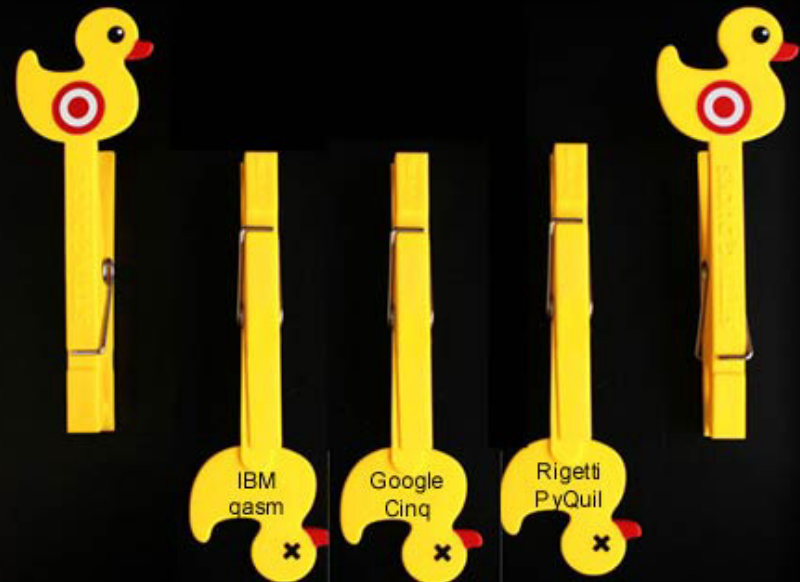


## Wide Tent 2/2

3. With BF, you can use our program Qubiter to write a quantum program in the Qubiter language which Qubiter can then translate into the IBM, Google and Rigetti quantum languages



Me Love ROSA  
Write Once, Simulate Anywhere



## Multiple Clouds

BF is a docker image so it's very portable across clouds.

Can be easily installed in multiple clouds. We plan to install it in at least 4 clouds, 2 in US, one in Japan, one in China

1. Amazon Cloud (AWS) (done)
2. Microsoft Cloud (Azure), Google Cloud or IBM Cloud (not yet)
3. Tencent Cloud (almost done)
4. Fujitsu Cloud (not yet)

Summary of slides so far:  
BayesForge embodies many ideals:

- Classical and Quantum Open Source
- Use BF to Develop Classical, Quantum or Hybrid AI Software (i.e., Quantum Ready Software)
- Wide Tent (BF includes software tools of many companies and often allows internet access to their hardware)
- Multiple Clouds (BF is a docker image so it's very portable across clouds. Will deploy in > 4 clouds)

## Why Use Bayesforge at all?

All the software available in BF is open source. You can easily load it, free of charge, into my PC, and use it there.

So why do you need to use BF at all?

- BF gives access to resources that might not be available on your PC, such as more GPU. This is very useful when dealing with Big Data, Statistics and AI. For example, Tensorflow can be slow as molasses without sufficient GPU
- Portability (for example, you can run Jupyter notebooks at a conference talk.)
- Avoid software installation hassles
- Facilitates long distance collaboration

## BF is Jupyter Notebook Centric.

### Pros & Cons of Jupyter Notebooks

- Jupyter Notebooks are not a very complete development environment. For this reason, I try to minimize the amount of code in the notebook. I put as much code as possible in Python files that the notebook calls. I write the Python files with PyCharm.
- Notebooks are poor at version control
- Notebooks are a great way of presenting interactive code examples, with plots, text and latex equations.
- You can call R and Python in same notebook using “magic”
- Notebooks can have widgets and embedded javascript, so they can be almost as “GUI friendly” as an old fashioned GUI application such as PowerPoint, but they are much more versatile, customizable and scriptable than old fashioned GUI apps.
- With BF, you use notebooks as an interface for interacting with the cloud. The cloud offers resources that a standard PC doesn't have, such as more GPU
- I love the way Prof. Chi Wei Cliburn Chan of Duke University uses Jupyter nbs to teach his applied statistics course <https://github.com/cliburn/sta-663-2016>

## Example of Classical Programming done with BF

Jupyter notebook from BF:

Choose any notebook from BF's TensorFlow examples folder

## Example of Quantum Programming done with BF

Background: Nice pedagogical article about Teleportation  
<https://owlcation.com/stem/Quantum-Teleportation>

Jupyter notebook from BF:  
[https://github.com/artiste-qb-net/qubiter/blob/master/jupyter-notebooks/Teleportation-showcasing-IF\\_M-blocks.ipynb](https://github.com/artiste-qb-net/qubiter/blob/master/jupyter-notebooks/Teleportation-showcasing-IF_M-blocks.ipynb)