



Build a Dashboard Application with Plotly Dash

In this lab, you will be building a Plotly Dash application for users to perform interactive visual analytics on SpaceX launch data in minutes.

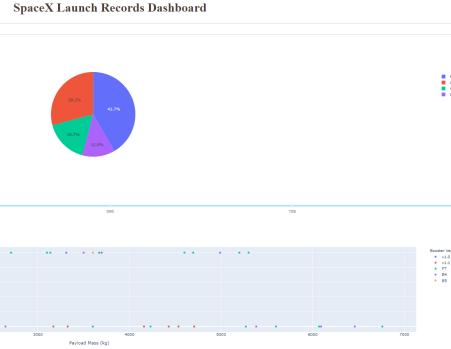
This dashboard application contains input components such as a dropdown list and a range slider to interact with a pie chart and a scatter point chart. You will be guided to build this dashboard application via the following tasks:

- TASK 1: Add a Launch Site Drop-down Input Component
- TASK 2: Add a Range Slider to Select Payload
- TASK 3: Add a Scatter Plot to Visualize Success Rates based on selected site, payload

Note: Take note screenshots of the Dashboard and save them. Further upload your notebook to gihub.

The giflab art and the screenshots are later required in the presentation slide.

Your completed dashboard application should look like the following screenshot:



After visual analysis using the dashboard, you should be able to obtain some insights to answer the following five questions:

1. Which site has the higher success rate?
2. Which site has the highest launch success rate?
3. Which payload objects has the highest launch success rate?
4. Which booster version (v4.0, v1.2, F9, F9E, B9E, etc.) has the highest success rate?
5. Which PP Booster version (v4.0, v1.2, F9, F9E, B9E, etc.) has the highest success rate?

Estimated time needed: 30 minutes

Important Notice about this lab environment

Please be aware that resources for this lab environment are not persistent. When you launch the Cloud IDE, you are presented with a 'dedicated computer on the cloud' exclusively for you. This is available to you as long as you are actively working on the labs.

Once you close your session or it is timed out due to inactivity, the session is terminated and all work is deleted along with any files you may have created, downloaded or uploaded.

The Cloud IDE will automatically log you out if you leave the lab unattended for a period of time.

If you finish only part of the lab and return later, you may have to start from the beginning. So, it is a good idea to plan your time accordingly and finish your labs in a single session.

Setup development environment

Install required Python packages

- Open a new terminal by clicking on the menu bar and selecting **Terminal > New Terminal**, as in the image below:

- Now, you have script and terminal ready to start the lab.

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File Edit Selection View Go Run Terminal Help
dash_interactivity.py x
1
theia@theiadocker-saishruthin: /home/project x
theia@theiadocker-saishruthin: /home/project$
```

• Install python packages required to run the application.

Copy and paste the below command to the terminal.

```
1. 1
2. pip install dash
```

Copy

```
theia@theiadocker-anitaj:~/home/project ×
theia@theiadocker-anitaj:~/home/projects$ python3.8 -m pip install pandas dash
Defaulting to user installation because normal site-packages is not writeable
Collecting pandas
  Downloading pandas-1.5.3-cp38-cp38-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (12.2 MB)
    12.2/12.2 MB 47.6 MB/s eta 0:00:00
Collecting dash
  Downloading dash-2.8.1-py3-none-any.whl (9.9 MB)
    9.9/9.9 MB 46.1 MB/s eta 0:00:00
Requirement already satisfied: pytz>=2020.1 in /home/theia/.local/lib/python3.8/site-packages (from pandas) (2022.1)
Requirement already satisfied: python-dateutil>=2.8.1 in /home/theia/.local/lib/python3.8/site-packages (from pandas) (2.8.2)
Collecting numpy>=1.20.3
  Downloading numpy-1.24.2-cp38-cp38-manylinux_2_17_x86_64.manylinux2014_x86_64.whl (17.3 MB)
    17.3/17.3 MB 36.6 MB/s eta 0:00:00
Collecting dash-html-components==2.0.0
  Downloading dash_html_components-2.0.0-py3-none-any.whl (4.1 kB)
Collecting plotly>=5.0.0
  Downloading plotly-5.13.1-py2.py3-none-any.whl (15.2 MB)
    15.2/15.2 MB 45.6 MB/s eta 0:00:00
Collecting dash-core-components==2.0.0
  Downloading dash_core_components-2.0.0-py3-none-any.whl (3.8 kB)
Collecting dash-table==5.0.0
  Downloading dash_table-5.0.0-py3-none-any.whl (3.9 kB)
Requirement already satisfied: Flask>=1.0.4 in /home/theia/.local/lib/python3.8/site-packages (from dash) (2.2.2)
Requirement already satisfied: importlib-metadata>=3.6.0 in /home/theia/.local/lib/python3.8/site-packages (from Flask>=1.0.4->dash) (4.12.0)
Requirement already satisfied: Werkzeug>=2.2.2 in /home/theia/.local/lib/python3.8/site-packages (from Flask>=1.0.4->dash) (2.2.2)
```

Download a skeleton dashboard application and dataset

First, let's get the SpaceX Dash dataset for this lab:

- Run the following apt command line in the terminal to download dataset as space_launch_dash.csv

```
1. apt-get https://r-courses-data.elsevier.cloud-object-storage.apponomics.cloud/IBW-06402108-Skillshare/Datasets/space_launch_dash.csv
```

Output

- Download a skeleton Dash app to be completed in this lab:

```
1. wget "https://r-courses-data.elsevier.cloud-object-storage.apponomics.cloud/IBW-06402108-Skillshare/labs/modules/3/space_dash_app.py"
```

Output

- Test the skeleton app by running the following command in the terminal:

```
1. python3.8 space_dash_app.py
```

Output

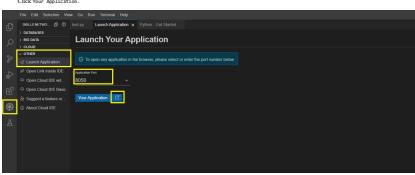
- Observe the port number (8050) shown in the terminal.

theia@theiadocker-anitaj:~/home/project ×

```
theia@theiadocker-anitaj:~/home/project$ python3.8 spacex_dash_app.py
spacex_dash_app.py:4: UserWarning:
The dash_html_components package is deprecated. Please replace
`import dash_html_components as html` with `from dash import html`
import dash_html_components as html
spacex_dash_app.py:5: UserWarning:
The dash_core_components package is deprecated. Please replace
`import dash_core_components as dcc` with `from dash import dcc`
import dash_core_components as dcc
Dash is running on http://127.0.0.1:8050

 * Serving Flask app 'spacex_dash_app'
 * Debug mode: off
WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
 * Running on http://127.0.0.1:8050
Press CTRL+C to quit
```

In the left Navigation Panel click on others and click Launch Application option under & Enter the application port number as 8050.



You should see a message box with a green indicating a successfully running dash app.

Note: we'll fill in the dashboard app with some input output components and callback functions.

If you want to finish your memory about Plotly Dash components and callback functions,

you may refer to the lab you have learned before.

Plotly Dash

TASK 1: Add a Launch Site Drop-down Input Component

We have four different launch sites and we would like to first see which one has the largest success count. Then, we would like to select one specific site and check its detailed success rate (close=0 vs. close=1).

As such, we will need a dropdown menu to let us select different launch sites.

Find and complete a commented `dcc.Dropdown(...)` input with following attributes:

The `options` attribute is a list of dict-like option objects (with `label` and `value` attributes). You can set the `label` attribute to be the name of the launch site in the `space_launch_dash.csv` file and the `value` attribute to be the ID of the launch site.

and you need to include the default all option, e.g.

```
1.     options=[{"label": "All sites", "value": "All"}, {"label": "Cape Canaveral", "value": "CC"}, {"label": "Kwajalein Atoll", "value": "KA"}, {"label": "Vandenberg Air Force Base", "value": "VA"}, {"label": "French Guiana", "value": "FG"}]
```

Output

value attribute with defined dropdown value to be all, meaning all sites are selected

= placeholder attribute to show a hint descriptive about this input area, such as select a launch site here

= searchable attribute to be True so we can enter keywords to search launch sites

Here is an example of `all_dropdowns`:

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Your completed dropdown menu should look like the following screenshot:

SpaceX Launch Records Dashboard

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TASK 2: Add a callback function to render success-pie-chart based on selected site dropdown

The general idea of the callback function is to get the selected launch site from site-dropdown and render pie chart.

Dash callback function is a type of Python function which will be automatically called by Dash whenever receiving an input component update, such as a click or dropdown selecting event.

If you need to refresh your memory about Plotly Dash callback functions, you can refer to the link below.

Plotly Dash Lab

Let's add a callback function in trace.launch_app.py including the following application logic:

```
# Input is set to be the site-dropdown, i.e., input(component_id='site-dropdown', component_property='value')
# Output is the graph with id success-pie-chart, i.e., output(component_id='success-pie-chart', component_property='figure')
# If ALL sites are selected, we will see all rows in the database spaces_of to render and return a pie chart graph to show the total success launches (i.e., the total count of class column)
# If specific site is selected, we will filter the database spaces_of first to include the only data for the selected site.
# Then, render and return a pie chart graph to show the success (class=1) count and failed (class=0) count for the selected site.
```

Here is an example of a callback function:

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