



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 real-time.

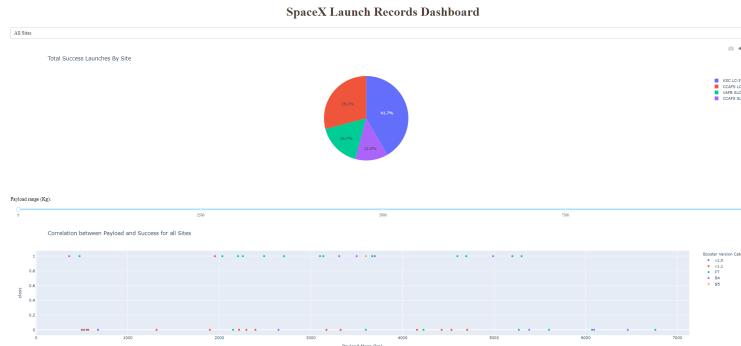
This dashboard application contains input components such as a dropdown list and a range slider to interact with a pie chart and a scatter point chart. You will be guided to build this dashboard application via the following tasks:

- TASK 1: Add a Launch Site Drop-down Input Component
- TASK 2: Add a Range Slider to Select Payload
- TASK 3: Add a Range Slider to Select Payload
- TASK 4: Add a callback function to render the success_payload_scatter_chart scatter plot

Note: Please take screenshots of the Dashboard and save them. Further upload your notebook to github.

The github url and the screenshots are later required in the presentation slides.

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 largest successful launches?
- 2 Which launch site has the highest success rate?
- 3 Which payload range(s) has the highest launch success rate?
- 4 Which rocket version (v1.0, v1.1, F9, F9R) has the highest launch success rate?
- 5 Which F9 booster version (v1.0, v1.1, F9, F9R) has the highest launch success rate?

Estimated time needed: 90 minutes

Important Notice about this lab environment

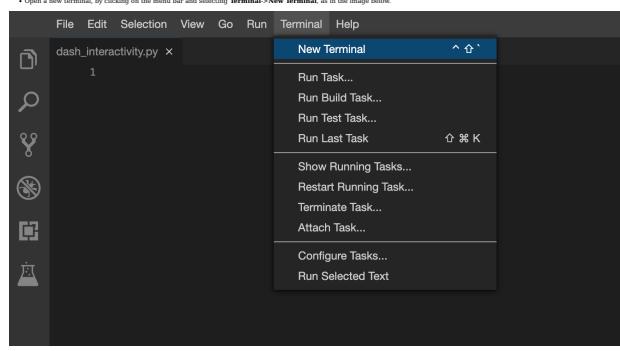
Please be aware that sessions for this lab environment are not persisted. When you launch the Cloud IDE, you are presented with a 'dedicated computer on the cloud' exclusively for you. This is available to you as long as you are actively working on the labs. Once you log off, and this session computer or the cloud is deleted along with any files you may have created, downloaded or installed.

The next time you launch this lab, a new environment is created for you. 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
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theia@theiadocker-saishruthin: /home/project$
```

- Install python packages required to run the application.

Copy and paste the below command to the terminal.

```
1. python3.8 -m pip install pandas dash
```

(Copied)

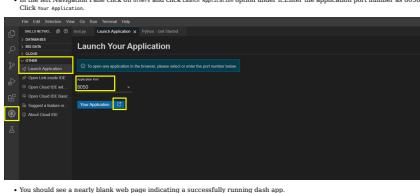
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theia@theiadocker-anitaj:~/home/project$ python3.8 -m pip install pandas dash
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Collecting dash
  Downloading dash-2.8.1-py3-none-any.whl (9.9 MB)
    9.9/9.9 MB 46.1 MB/s eta 0:00:00
Requirement already satisfied: pytz>=2020.1 in /home/theia/.local/lib/python3.8/site-packages (from pandas) (2022.1)
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Collecting numpy>=1.20.3
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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 Launch dataset for this lab:
  • Run the following wget command in the terminal to download dataset as space_launch_dash.csv
  1. wget "https://cf-courses-data.ux.s3.us.cloud-object-storage.appendix.cloud/DR-05032020-SatelliteNetwork/datasets/spaceship_launch_dash.csv"
[Copied]
  • Download a skeleton Dash app to be completed in this lab:
  1. 1. wget "https://cf-courses-data.ux.s3.us.cloud-object-storage.appendix.cloud/DR-05032020-SatelliteNetwork/labs/module_3/spaceship_dash_app.py"
[Copied]
  • Test the skeleton app by running the following command in the terminal:
  1. 1. python3.8 spaceship_dash_app.py
[Copied]
  • Observe the port number (8050) shown in the terminal.
```

```
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theia@theiadocker-anitaj:~/home/project$ python3.8 spaceship_dash_app.py
spaceship_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
spaceship_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 'spaceship_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 notebooks and click Launch application option under it Enter the application port number as 8050.

Click your Application.

The application will open in a new tab. You can see the application has required imported components and callback functions.

If you need to refresh your memory about Plotly Dash components and callback functions, you may refer to the lab you have learned before.

[Plotly Dash Lab](#)

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 (class=0 vs. class=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:

- `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 space, and

- and you need to include the default `value` option, e.g.,

`1. options=[{"label": "All Sites", "value": "All"}, {"label": "Site A", "value": "Site A"}, ...]`

- `placeholder` attribute to show text description about this input area,

such as Select a launch site,

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

Here is an example of `dcc.Dropdown`:

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a pie chart visualizing launch success counts.

Data callback function is a type of Python code which will be automatically called by Dash whenever a specific component updates, such as a click or dropdown selecting event.

If you need to refresh your memory about Plotly Dash callback function,

you may refer to the lab you learned before:

[Plotly Dash Reference](#)

Let's add a callback function in `sites` app as including the following application logic:

```
• Input is set to be the site dropdown, i.e., dcc_dropdown_in_valuelabels, component property value
• Output is to be the graph with id success-pie-chart, i.e., dcc_components_id-success-pie-chart-component_property-figure
• A callback function is checked, if sites were selected just a specific launch site was selected
  If all sites are selected, we can ignore the row of the data frame or to do so, we can return a pie chart graph to show the total success launches (i.e., the total count of class column)
  If a specific launch site is selected, you need to filter the database sites, or first in order
  to ignore other launch sites, we can return a pie chart graph to show the success (class==1) count and failed (class==0) count 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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14. # Function descriptor to specify function input and output
15. def get_pie_chart(component_id='success-pie-chart', component_property='figure'):
16.     df = pd.read_csv('spacex_launch_dash.csv')
17.     if component_id == 'ALL':
18.         # ALL sites are selected
19.         # calculate the success rate for each class
20.         # names pie chart names
21.         # return tag
22.     else:
23.         # return the outcomes piechart for a selected site
```

Solved

The rendered pie chart should look like the following screenshots:



If you need more reference about dash callbacks and plotly pie charts, refer to the [Plotly Dash Reference](#) section towards the end of this lab.

TASK 3: Add a Range Slider to Select Payload

Next, we want to find if variable payload is correlated to mission outcome. From a dashboard point of view, we want to visually select different payload range and see if we can identify some visual patterns.

Find and complete a commented `cc.sites_payload(payload_min...,)` input with the following attribute:

- `id` to be payload
- `min` indicating the slider starting point, we set it to be 0 (Kg)
- `max` indicating the slider ending point, we set it to be 1000 (Kg)
- `marks` indicating the slider intervals, we set its value to be 1000 (Kg)
- `value` indicating the current selected range, we could set it to be `sse_payload` and `max_payload`

Here is an example of `dccSlider`:

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