Fraud Detection

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# Introduction

## About

This is document to setup and run Fraud Detection Application.

Fraud Detection Application consists of two parts. Data Load part and Web Service Side. The Data load happens from Oracle DB to Elasticsearch using Logstash. This Elasticsearch data is then used by Python. Python uses an algorithm to find if the user’s latest data is in par with his older trend of data. The algorithm runs, and results are sent back to User Interface in JSON format. The UI renders is properly format.

# Oracle DB Installation & Setup Process

## Oracle DB Setup

To install Oracle database on your computer, you need to download the installer from the [download page](http://www.oracle.com/technetwork/database/enterprise-edition/downloads/index.html) of Oracle website.

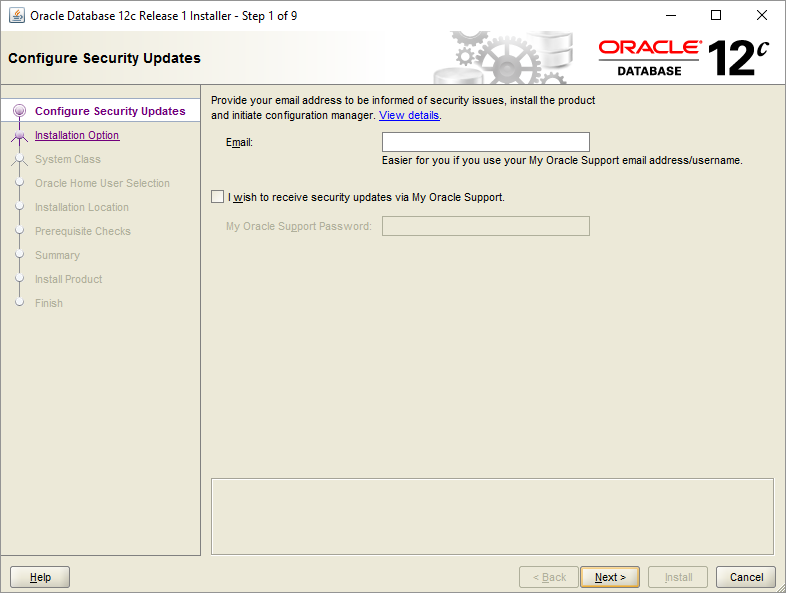
After having the installation files which are in ZIP format, you need to extract them into a specific folder on your computer.

The following picture shows the structure of the folder of the Oracle installation files after extraction.

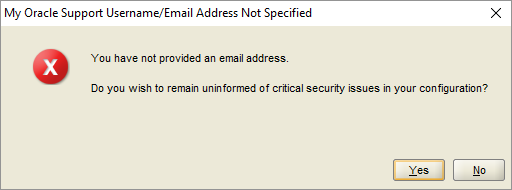


Now you need to double-click the setup.exe file to start the installation process. There will be 9 steps which mostly automatically execute.

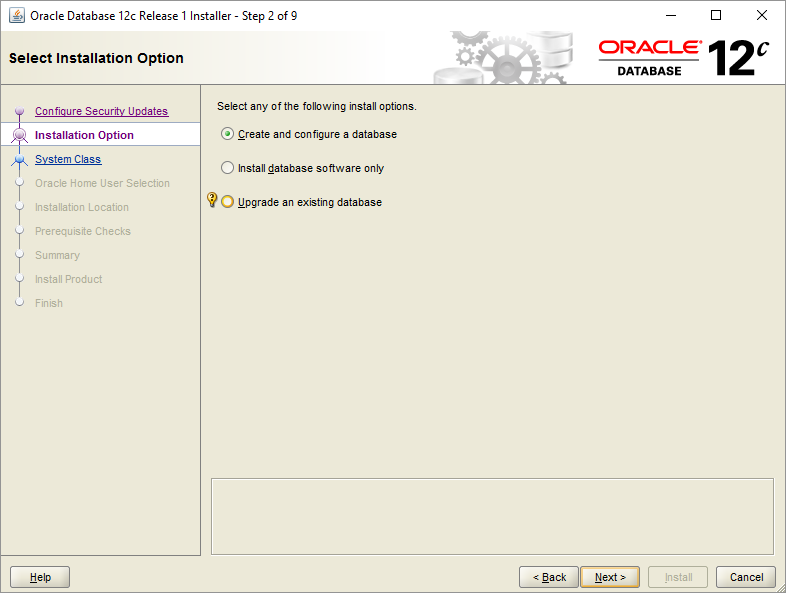
**Step 1**. The installer asks you to provide your email address to get the latest security issues and updates. You can ignore it by clicking the Next button

[](http://www.oracletutorial.com/wp-content/uploads/2015/12/Install-Oracle-Step-1.png)

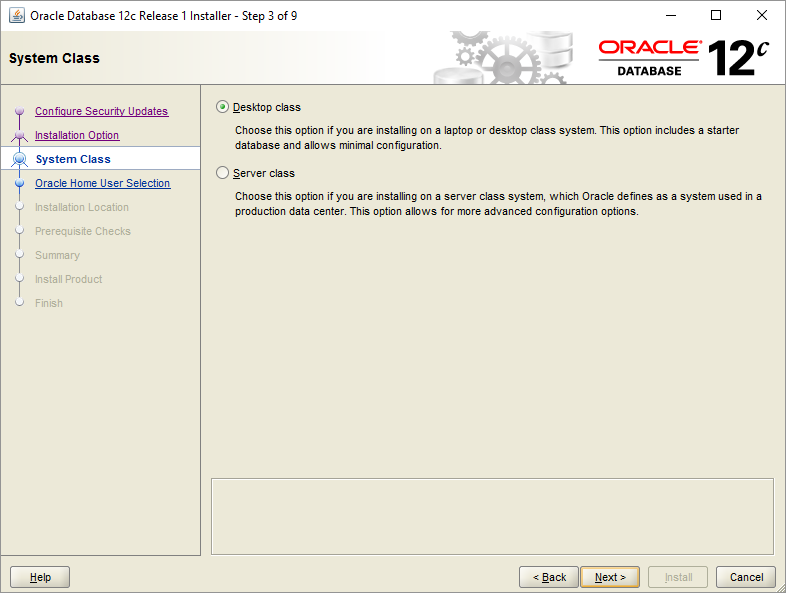
Because I didn’t provide the email address, the Oracle database installer confirm it, you just need to click the No button to continue.

[](http://www.oracletutorial.com/wp-content/uploads/2015/12/Install-Oracle-Step-1-1.png)

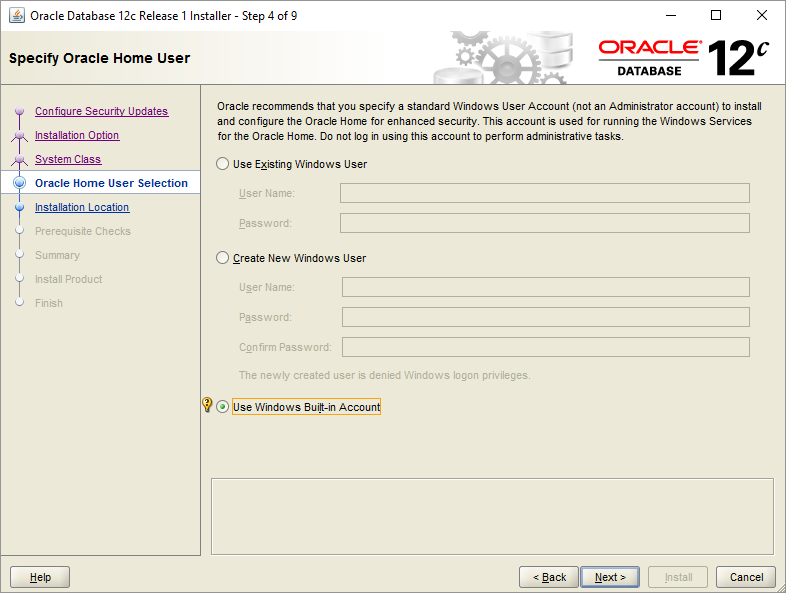
**Step 2**. In step 2, Oracle installer ask you to whether you want to create and configure a database, install database software only or just upgrade an existing database. Because you install the Oracle database at the first time, choose the option 1 and click the Next button.



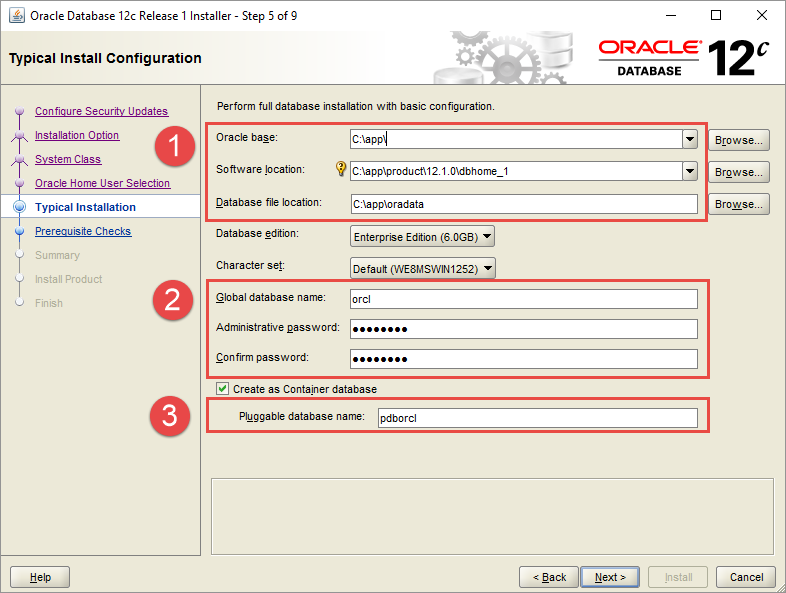
**Step 3.**The installer allows you to choose the system class. Because you install Oracle on your computer, not a server, therefore, you choose the first option: desktop class and click the Next button.



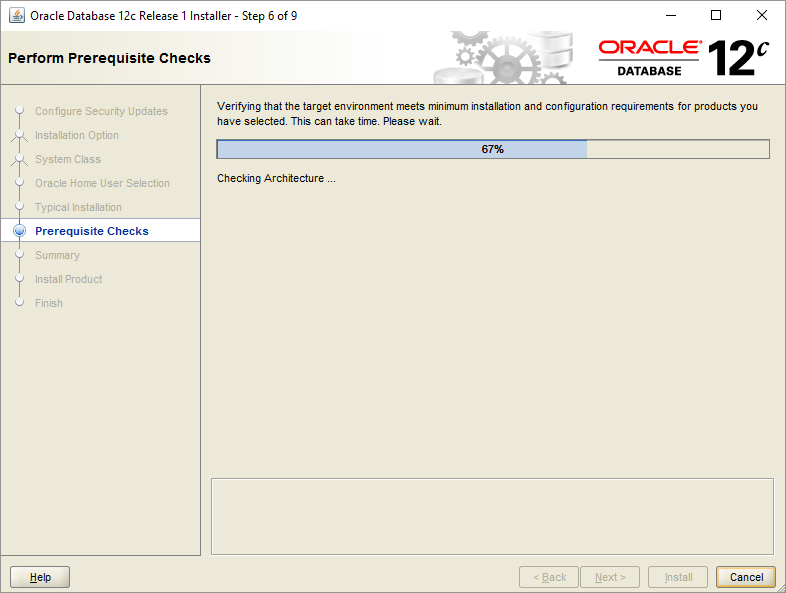
**Step 4.**This step allows you to specify the Windows user account to install and configure Oracle Home for enhanced security. Choose the third option: “Use Windows Built-in Account”.

[](http://www.oracletutorial.com/wp-content/uploads/2015/12/Install-Oracle-Step-4.png)

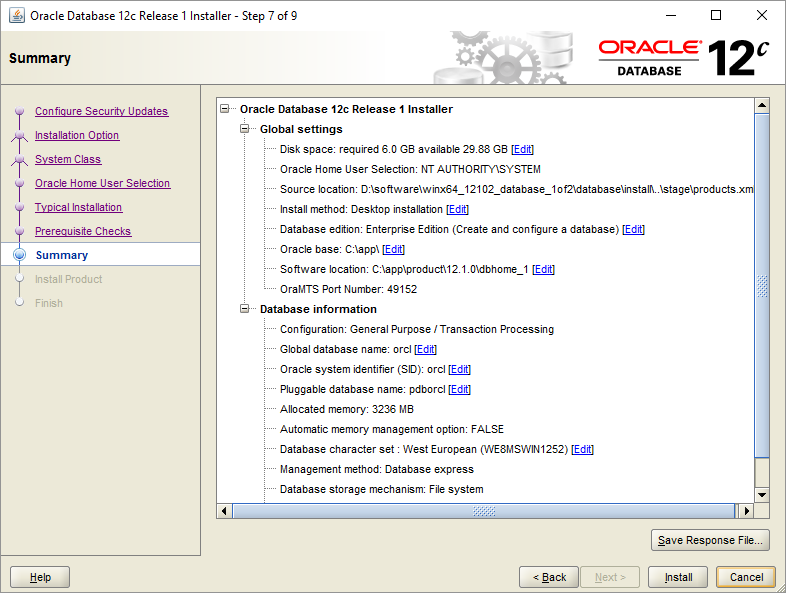
**Step 5.**in this step you can (1) choose the folder on which Oracle database will be installed, (2) Global database name and password, (3) pluggable database name.



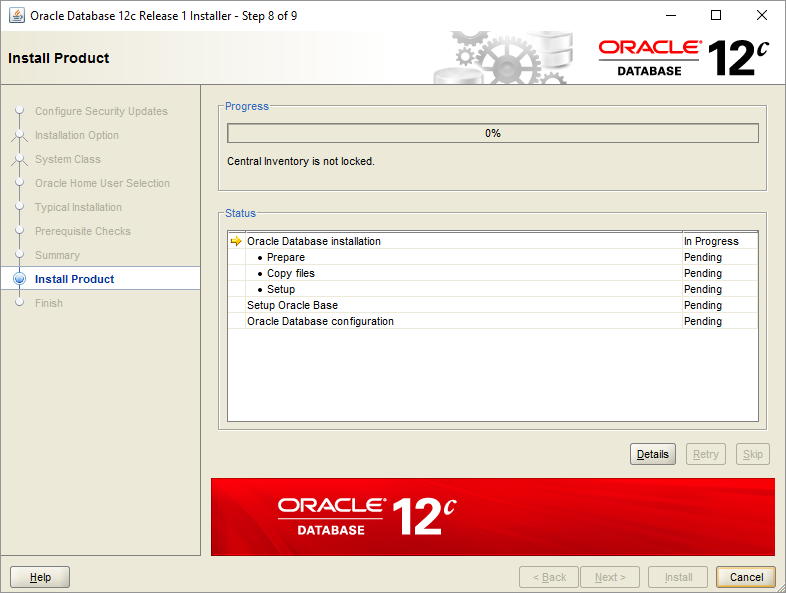
**Step 6.**The installer performs the prerequisite check.

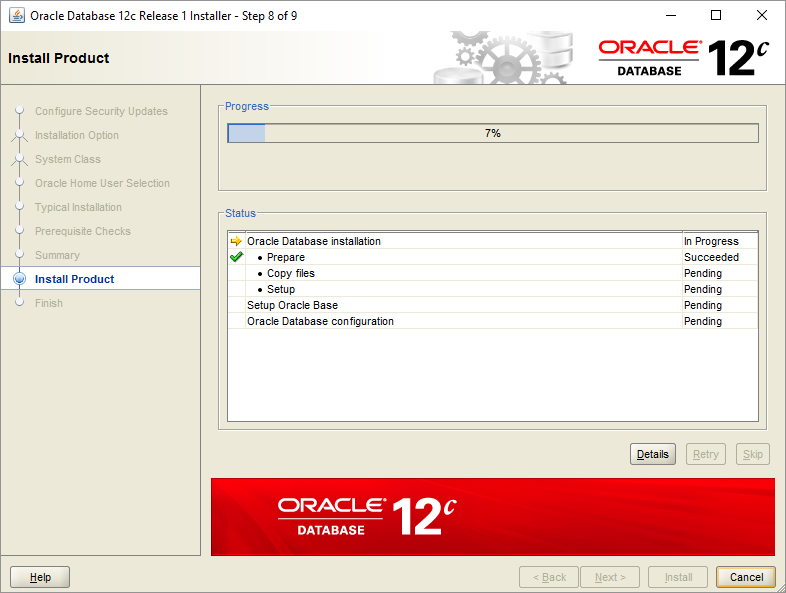


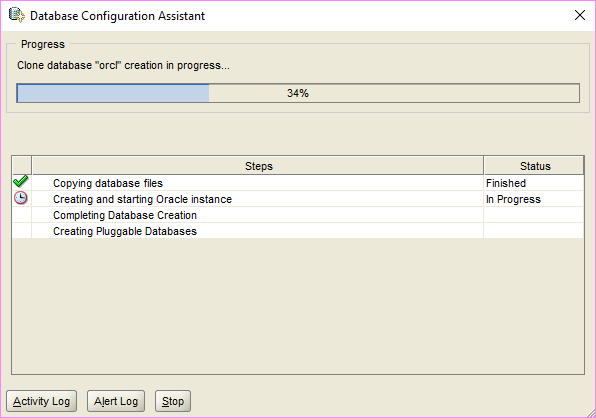
**Step 7**.  The installer shows you the summary of the information such as global settings, database information, etc. You need to review the information and click the install button if everything is fine.



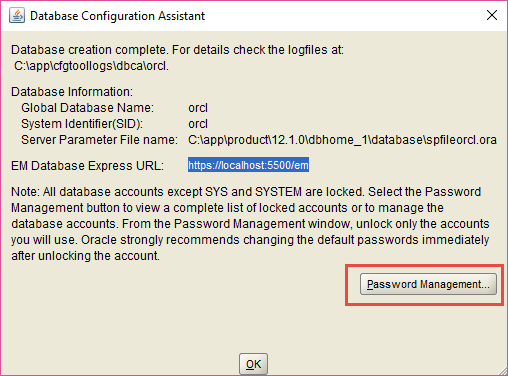
**Step 8.**The installer starts installing Oracle database. It will take a few minutes to complete, depending on your computer.



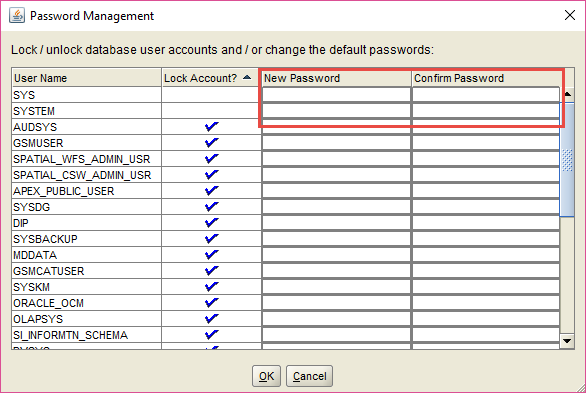


[](http://www.oracletutorial.com/wp-content/uploads/2015/12/Install-Oracle-Step-8-2.png)

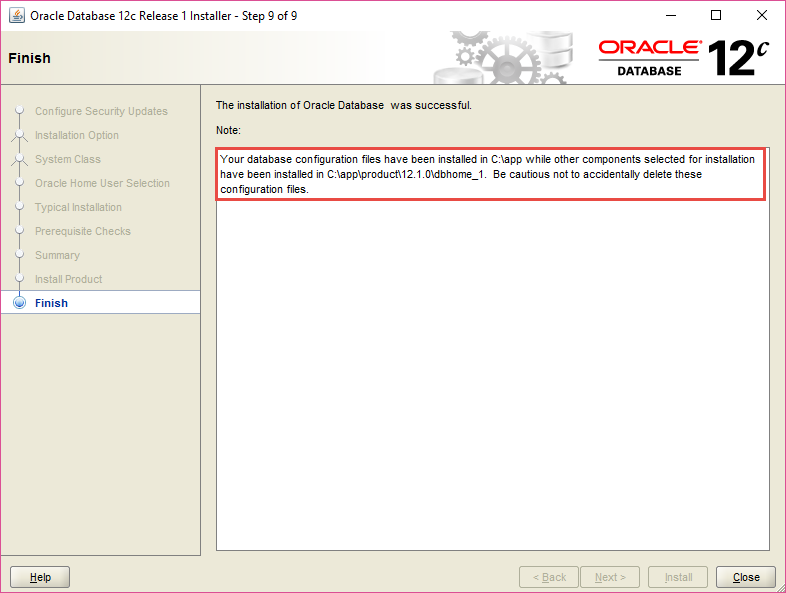
You will see the Database Configuration Assistant window. Click the Password management… button to enter the password for Oracle database accounts.

[](http://www.oracletutorial.com/wp-content/uploads/2015/12/Install-Oracle-Step-8-4.png)

Enter the password for SYS and SYSTEM accounts and then click OK button.

[](http://www.oracletutorial.com/wp-content/uploads/2015/12/Install-Oracle-Step-8-5.png)

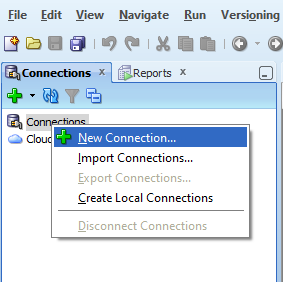
**Step 9.**Once installation completes successfully, the installer will inform you as shown in the following screenshot. Click the Close button to close the window.



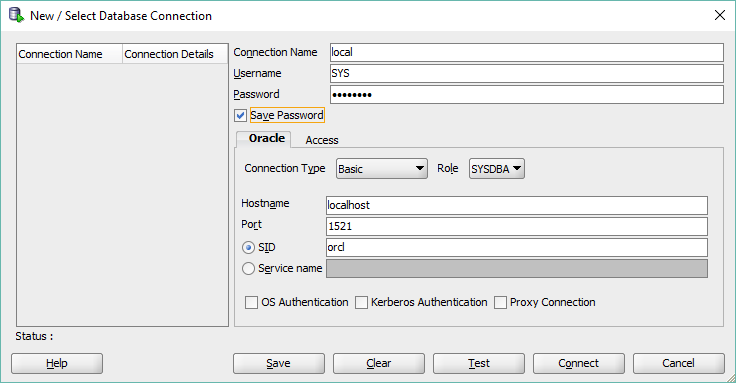
## 4.2 Connecting to Oracle Database

First, launch the SQL developer application provided by the Oracle Database.

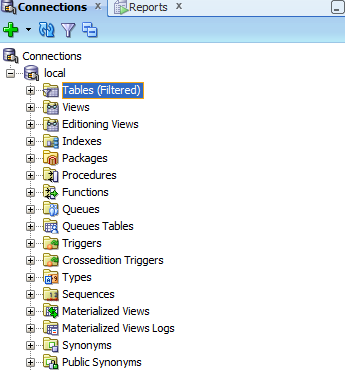
Second, right-click the connections node and choose **New Connection …** menu item to create a new connection.

[](http://www.oracletutorial.com/wp-content/uploads/2015/12/SQL-Developer.png)

Third, enter the information that you provided during the installation process as shown in the following screenshot. Click the Connect button to connect to the Oracle Database.

[](http://www.oracletutorial.com/wp-content/uploads/2015/12/SQL-Developer-New-Connection.png)

SQL developer will display all objects as shown below.

[](http://www.oracletutorial.com/wp-content/uploads/2015/12/SQL-Developer-Connected.png)

Congratulation! you have installed Oracle Database 12c successfully. Let’s start exploring Oracle.

## Table Creation and Data Insertion

Run DDL command to create table.

CREATE TABLE AI\_DATA\_FEED (

INDV\_ID number(10) DEFAULT NULL,

CASE\_NUM number(10) DEFAULT NULL,

REF\_ININDV\_ID varchar2(10) DEFAULT NULL,

DOB\_DT varchar2(23) DEFAULT NULL,

LAST\_NAME varchar2(8) DEFAULT NULL,

FIRST\_NAME varchar2(8) DEFAULT NULL,

GENDER\_CD varchar2(1) DEFAULT NULL,

INACTIVE\_IND varchar2(1) DEFAULT NULL,

ACTIVE\_IN\_CASE\_SW varchar2(1) DEFAULT NULL,

EFF\_BEGIN\_DT varchar2(23) DEFAULT NULL,

HIST\_NAV\_IND varchar2(1) DEFAULT NULL,

SSN\_SW varchar2(1) DEFAULT NULL,

RESIDENCY\_STATE\_CD varchar2(2) DEFAULT NULL,

US\_CITIZEN\_SW varchar2(1) DEFAULT NULL,

RELATIONSHIP\_TYPE\_CD varchar2(4) DEFAULT NULL,

PREPARES\_AND\_PURCHASES\_SW varchar2(1) DEFAULT NULL,

RELATIONSHIP\_VRF\_CD varchar2(2) DEFAULT NULL,

VERF\_RECEIVED\_DT varchar2(23) DEFAULT NULL,

PAYMENT\_FREQUENCY\_CD varchar2(2) DEFAULT NULL,

EMPLOYER\_NAME varchar2(23) DEFAULT NULL,

EXPENSES\_SW varchar2(1) DEFAULT NULL,

INCOME\_IS\_ACCESSIBLE\_SW varchar2(1) DEFAULT NULL,

JOB\_TITLE varchar2(20) DEFAULT NULL,

PROJECTION\_PERIOD\_DAYS\_CD varchar2(2) DEFAULT NULL,

EMPLOYMENT\_START\_DT varchar2(23) DEFAULT NULL,

PROJECTION\_PERIOD\_END\_DT varchar2(23) DEFAULT NULL,

PROJECTION\_PERIOD\_START\_DT varchar2(23) DEFAULT NULL,

PROVIDER\_ID varchar2(6) DEFAULT NULL,

LOST\_EMPLOYMENT\_SW varchar2(1) DEFAULT NULL,

PROCESS\_ID varchar2(2) DEFAULT NULL,

IS\_COMPLETE\_SW\_2 varchar2(1) DEFAULT NULL,

INSURANCE\_INCOME\_AMT varchar2(6) DEFAULT NULL,

HOURS\_WK varchar2(4) DEFAULT NULL,

PLAN\_TO\_GAIN\_IND\_SW varchar2(1) DEFAULT NULL,

EMP\_SEQ\_NUM\_1 varchar2(7) DEFAULT NULL,

PAY\_EXP\_SEQ\_NUM varchar2(7) DEFAULT NULL,

PAYMENT\_EXPENSE\_DT varchar2(23) DEFAULT NULL,

PAYMENT\_EXPENSE\_AMT varchar2(4) DEFAULT NULL,

PAYMENT\_EXPENSE\_FREQUENCY\_CD varchar2(2) DEFAULT NULL,

PAYMENT\_EXPENSE\_VRF\_CD varchar2(2) DEFAULT NULL,

GROSS\_PAY\_PERIOD\_AMT varchar2(4) DEFAULT NULL,

HOURS\_PER\_WK varchar2(2) DEFAULT NULL,

INCLUDE\_PAYMENT\_EXPENSE\_SW varchar2(1) DEFAULT NULL,

PAYMENT\_INDICATOR\_CD varchar2(1) DEFAULT NULL,

REGULAR\_HOURS varchar2(2) DEFAULT NULL,

TYPE\_CD\_1 varchar2(1) DEFAULT NULL,

VERF\_RECEIVED\_DT\_2 varchar2(23) DEFAULT NULL,

CHANGE\_ACTION\_DT varchar2(23) DEFAULT NULL,

UNEARNED\_SEQ\_NUM varchar2(7) DEFAULT NULL,

UNEARNED\_INCOME\_TYPE\_CD varchar2(4) DEFAULT NULL,

VERF\_RECEIVED\_DT\_3 varchar2(23) DEFAULT NULL,

PAYMENT\_FREQUENCY\_CD\_1 varchar2(2) DEFAULT NULL,

RESOURCE\_SEQ\_NUM varchar2(1) DEFAULT NULL,

CONTRIBUTION\_ININDV\_ID varchar2(1) DEFAULT NULL,

UNEARNED\_SOURCE\_CD varchar2(2) DEFAULT NULL,

UNEARNED\_INCOME\_VRF\_CD varchar2(2) DEFAULT NULL,

OTHER\_INCOME\_AMT varchar2(4) DEFAULT NULL,

PROG\_CD varchar2(2) DEFAULT NULL,

AID\_REQUEST\_SW varchar2(1) DEFAULT NULL,

POLICY\_YEAR number(10) DEFAULT NULL,

AVERAGE\_MONTHLY\_HOURS varchar2(5) DEFAULT NULL,

BUDGETED\_AMT varchar2(6) DEFAULT NULL,

BUDGET\_TYPE\_CD varchar2(2) DEFAULT NULL,

MA\_BUDGET\_AMT varchar2(6) DEFAULT NULL,

MA\_PROJECTED\_AMT varchar2(5) DEFAULT NULL,

PAYMENTS\_EXPECTED varchar2(1) DEFAULT NULL,

PAYMENTS\_RECEIVED varchar2(1) DEFAULT NULL,

PROJECTED\_HOURS varchar2(4) DEFAULT NULL,

PROJECTION\_AMT varchar2(5) DEFAULT NULL

) ;

Insert Data:

INSERT INTO AI\_DATA\_FEED (INDV\_ID, CASE\_NUM, REF\_ININDV\_ID, DOB\_DT, LAST\_NAME, FIRST\_NAME, GENDER\_CD, INACTIVE\_IND, ACTIVE\_IN\_CASE\_SW, EFF\_BEGIN\_DT, HIST\_NAV\_IND, SSN\_SW, RESIDENCY\_STATE\_CD, US\_CITIZEN\_SW, RELATIONSHIP\_TYPE\_CD, PREPARES\_AND\_PURCHASES\_SW, RELATIONSHIP\_VRF\_CD, VERF\_RECEIVED\_DT, PAYMENT\_FREQUENCY\_CD, EMPLOYER\_NAME, EXPENSES\_SW, INCOME\_IS\_ACCESSIBLE\_SW, JOB\_TITLE, PROJECTION\_PERIOD\_DAYS\_CD, EMPLOYMENT\_START\_DT, PROJECTION\_PERIOD\_END\_DT, PROJECTION\_PERIOD\_START\_DT, PROVIDER\_ID, LOST\_EMPLOYMENT\_SW, PROCESS\_ID, IS\_COMPLETE\_SW\_2, INSURANCE\_INCOME\_AMT, HOURS\_WK, PLAN\_TO\_GAIN\_IND\_SW, EMP\_SEQ\_NUM\_1, PAY\_EXP\_SEQ\_NUM, PAYMENT\_EXPENSE\_DT, PAYMENT\_EXPENSE\_AMT, PAYMENT\_EXPENSE\_FREQUENCY\_CD, PAYMENT\_EXPENSE\_VRF\_CD, GROSS\_PAY\_PERIOD\_AMT, HOURS\_PER\_WK, INCLUDE\_PAYMENT\_EXPENSE\_SW, PAYMENT\_INDICATOR\_CD, REGULAR\_HOURS, TYPE\_CD\_1, VERF\_RECEIVED\_DT\_2, CHANGE\_ACTION\_DT, UNEARNED\_SEQ\_NUM, UNEARNED\_INCOME\_TYPE\_CD, VERF\_RECEIVED\_DT\_3, PAYMENT\_FREQUENCY\_CD\_1, RESOURCE\_SEQ\_NUM, CONTRIBUTION\_ININDV\_ID, UNEARNED\_SOURCE\_CD, UNEARNED\_INCOME\_VRF\_CD, OTHER\_INCOME\_AMT, PROG\_CD, AID\_REQUEST\_SW, POLICY\_YEAR, AVERAGE\_MONTHLY\_HOURS, BUDGETED\_AMT, BUDGET\_TYPE\_CD, MA\_BUDGET\_AMT, MA\_PROJECTED\_AMT, PAYMENTS\_EXPECTED, PAYMENTS\_RECEIVED, PROJECTED\_HOURS, PROJECTION\_AMT)

SELECT 138160, 501102254, '138175', '19-MAY-2013 12.00.00 AM', 'RRMTLSJY', 'JGRVOPZM', 'M', 'N', 'Y', '01-SEP-2016 12.00.00 AM', 'F', 'Y', 'RI', 'Y', 'CH', 'Y', 'BC', '18-MAY-2018 12.00.00 AM', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', 'MA', 'N', 2013, '', '', '', '', '', '', '', '', '' FROM dual UNION ALL

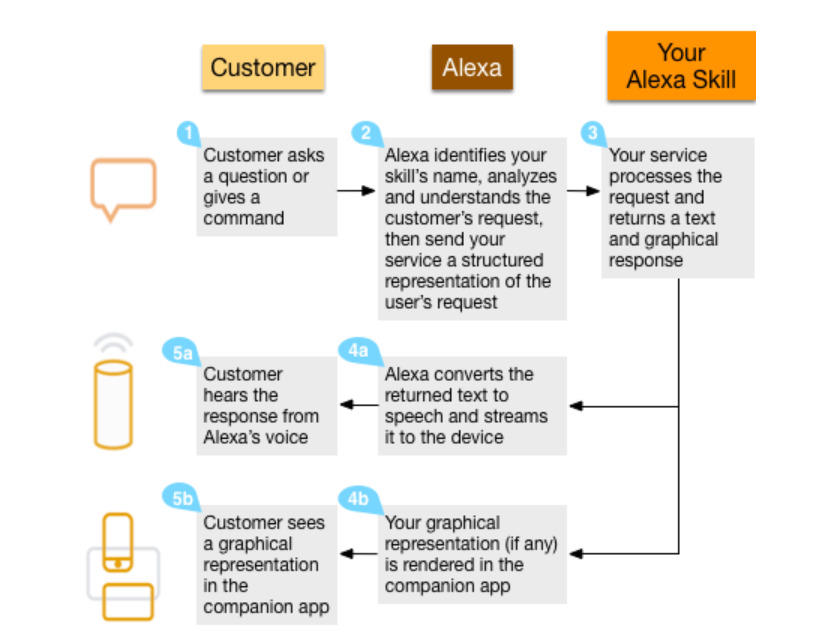
SELECT 138160, 501102254, '138175', '19-MAY-2013 12.00.00 AM', 'RRMTLSJY', 'JGRVOPZM', 'M', 'N', 'Y', '01-SEP-2016 12.00.00 AM', 'F', 'Y', 'RI', 'Y', 'CH', 'Y', 'OT', '26-JUN-2018 10.30.22 AM', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', 'MA', 'N', 2013, '', '', '', '', '', '', '', '', '' FROM dual UNION ALL

SELECT 138160, 501102254, '446699', '19-MAY-2013 12.00.00 AM', 'RRMTLSJY', 'JGRVOPZM', 'M', 'N', 'Y', '01-SEP-2016 12.00.00 AM', 'F', 'Y', 'RI', 'Y', 'SB', 'Y', 'BC', '12-JAN-2018 11.46.25 AM', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', 'MA', 'N', 2013, '', '', '', '', '', '', '', '', '' FROM dual UNION ALL

SELECT 138160, 501102254, '446699', '19-MAY-2013 12.00.00 AM', 'RRMTLSJY', 'JGRVOPZM', 'M', 'N', 'Y', '01-SEP-2016 12.00.00 AM', 'F', 'Y', 'RI', 'Y', 'SB', 'Y', 'OT', '26-JUN-2018 10.30.22 AM', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', '', 'MA', 'N', 2013, '', '', '', '', '', '', '', '', '' FROM dual;

COMMIT:

This will insert data in Oracle DB.



# Elasticsearch Setup

## Introduction

We need to push data from DB to Elasticsearch. Elasticsearch is will host the data for UI API to consume data. Elasticsearch can store millions of records and render then in split seconds. It can also be used to find patterns in data (analytics)

## Basic Setup

* + 1. Download the .zip archive for Elasticsearch v6.2.4 from: https://artifacts.elastic.co/downloads/elasticsearch/elasticsearch-6.2.4.zip
    2. Unzip it with your favourite unzip tool. This will create a folder called elasticsearch-6.2.4, which we will refer to as %ES\_HOME%. In a terminal window, cd to the %ES\_HOME% directory, for instance:
    3. cd c:\elasticsearch-6.2.4. Go inside the es directory and go inside config folder and change the below properties in elasticsearch.yml file:  
          
       network.host: {ip of the server}  
       http.port: 9200 (or any other port if this is occupied)
    4. Come back to ES\_HOME and run the below command:  
       .\bin\elasticsearch.bat
    5. This will start ES server.   
       Test it by running a get command against ip-name:9200. It will tell the details about ES cluster.

Reference: [**https://www.elastic.co/guide/en/elasticsearch/reference/6.2/zip-windows.html**](https://www.elastic.co/guide/en/elasticsearch/reference/6.2/zip-windows.html)

# Logstash Setup and Usage

## Introduction

Logstash is middleware technology used to do sync up activities.

## Logstash Setup

1. If necessary, download and install the latest version of the Java from [**www.java.com**](https://www.java.com/).
2. Download the Logstash 5.6.14 Windows zip file from the [**downloads page**](https://www.elastic.co/downloads/logstash).
3. Extract the contents of the zip file to a directory on your computer, for example, C:\Program Files.
4. Now Logstash is ready to run. Once it gets config file.

## Run Logstash

* + 1. Place conf file at any feasible location. (Good to place inside logstash-x-x-x folder) 
    2. To start logstash with this config file.
    3. Go inside logstash-x-x-x and run .\bin\logstash -f db\_es\_fraud\_detection.conf
    4. This will sync up data between DB and ES.

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# Python Service Setup and Usage

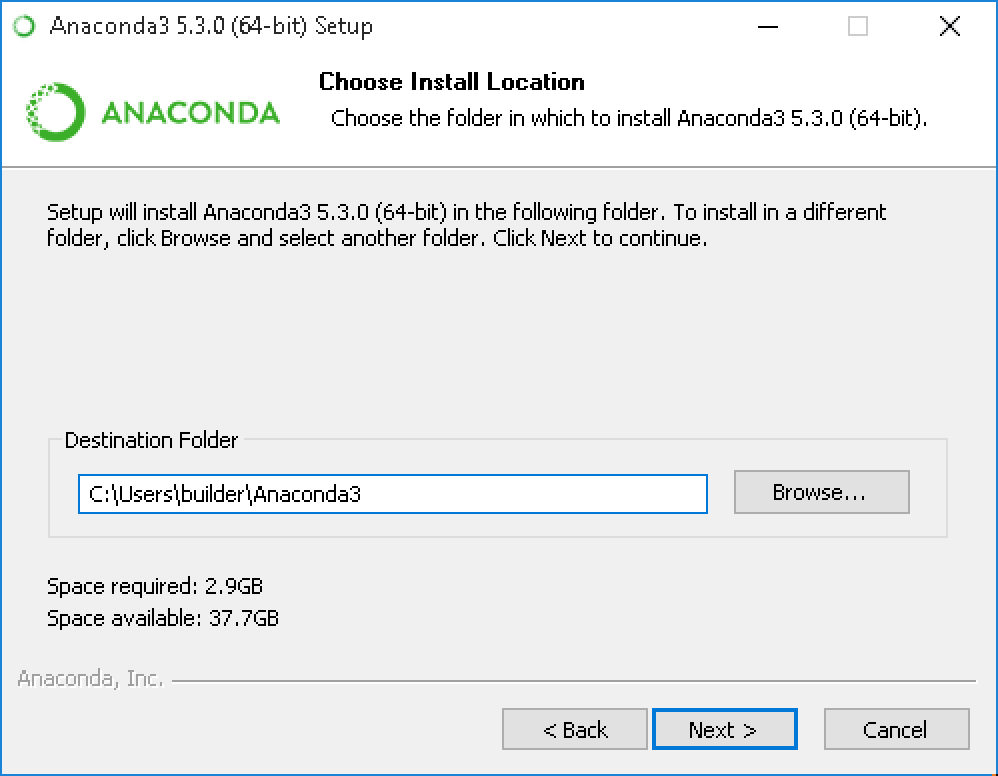
We will use python Flask API to provide service to Angular JS code. To run python we will use Anaconda. We need to install Flask API too.

## Install Anaconda:

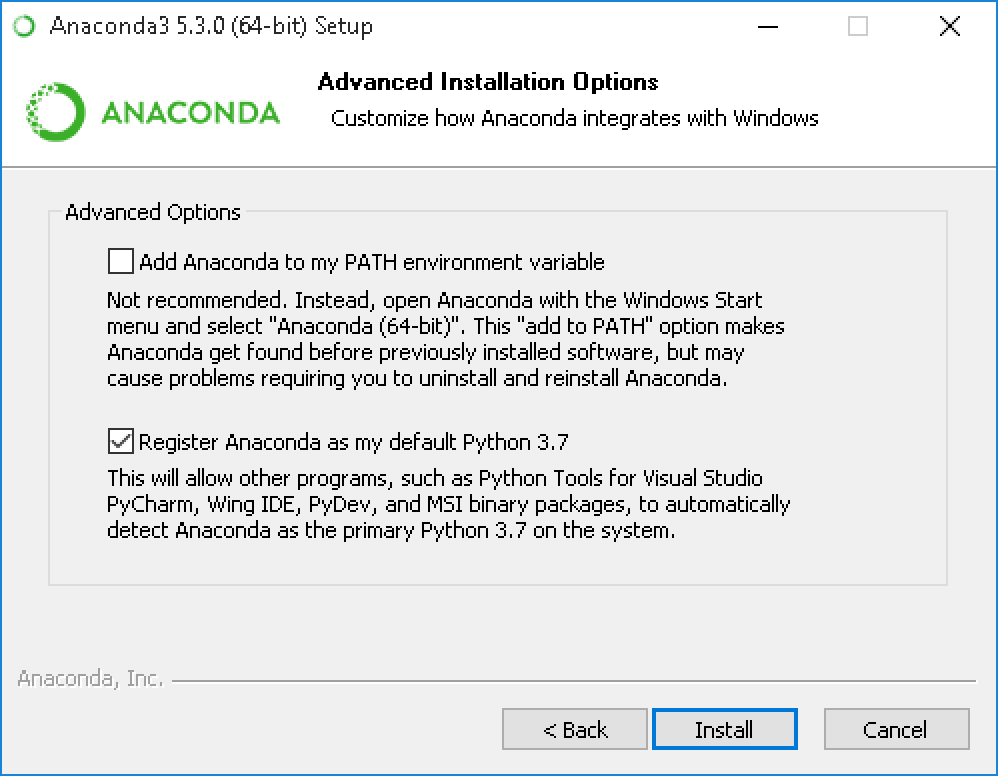
Ref Doc: [**https://docs.anaconda.com/anaconda/install/windows/**](https://docs.anaconda.com/anaconda/install/windows/)

1. [**Download the Anaconda installer**](https://www.anaconda.com/download/#windows).
2. Double click the installer to launch.
3. Click Next.
4. Read the licensing terms and click “I Agree”.
5. Select an install for “Just Me” unless you’re installing for all users (which requires Windows Administrator privileges) and click Next.
6. Select a destination folder to install Anaconda and click the Next button.
7. NOTE: Install Anaconda to a directory path that does not contain spaces or unicode characters.

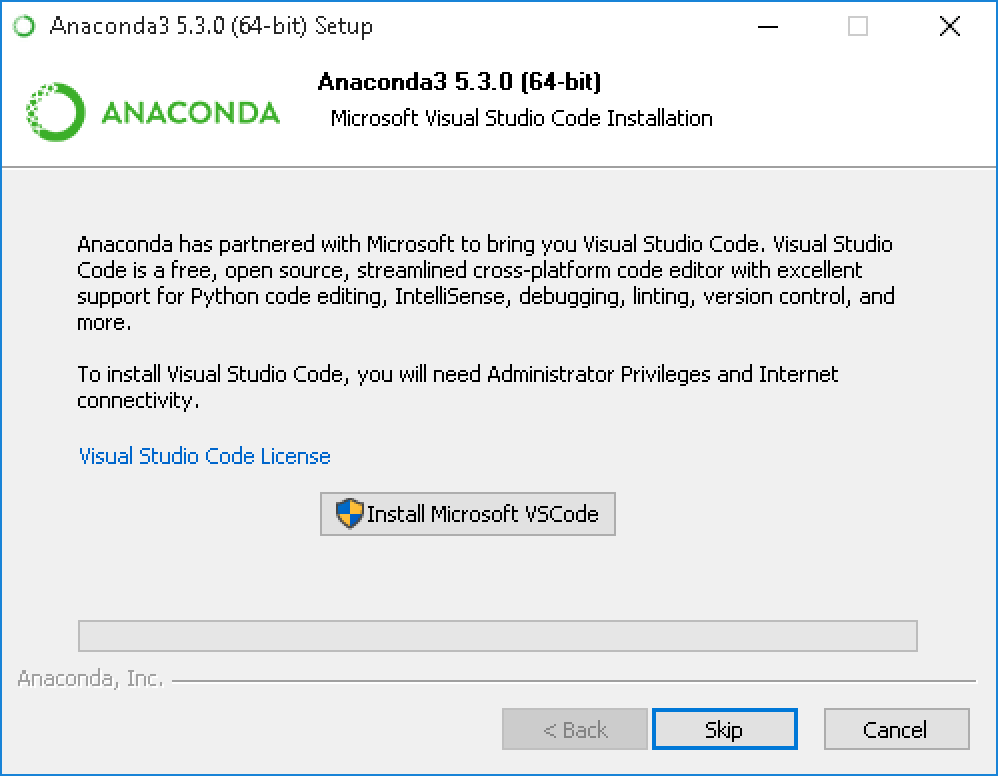
NOTE: Do not install as Administrator unless admin privileges are required.

[](https://docs.anaconda.com/_images/install-win-destination.png)

1. Choose whether to add Anaconda to your PATH environment variable. We recommend not adding Anaconda to the PATH environment variable, since this can interfere with other software. Instead, use Anaconda software by opening Anaconda Navigator or the Anaconda Prompt from the Start Menu.

[](https://docs.anaconda.com/_images/install-win-path.png)

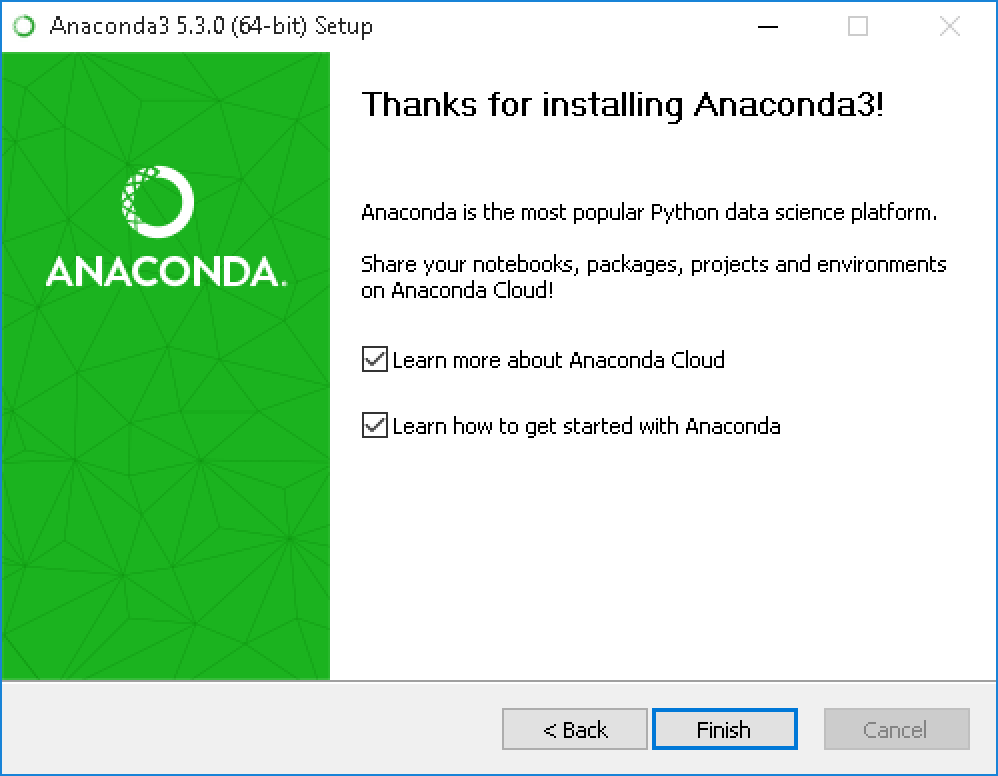
1. Choose whether to register Anaconda as your default Python. Unless you plan on installing and running multiple versions of Anaconda, or multiple versions of Python, accept the default and leave this box checked.
2. Click the Install button. If you want to watch the packages Anaconda is installing, click Show Details.
3. Click the Next button.
4. Optional: To [install VS Code](https://docs.anaconda.com/anaconda/user-guide/tasks/integration/vscode/), click the Install Microsoft VS Code button. After the install completes click the Next button.

[](https://docs.anaconda.com/_images/vscode-install.png)

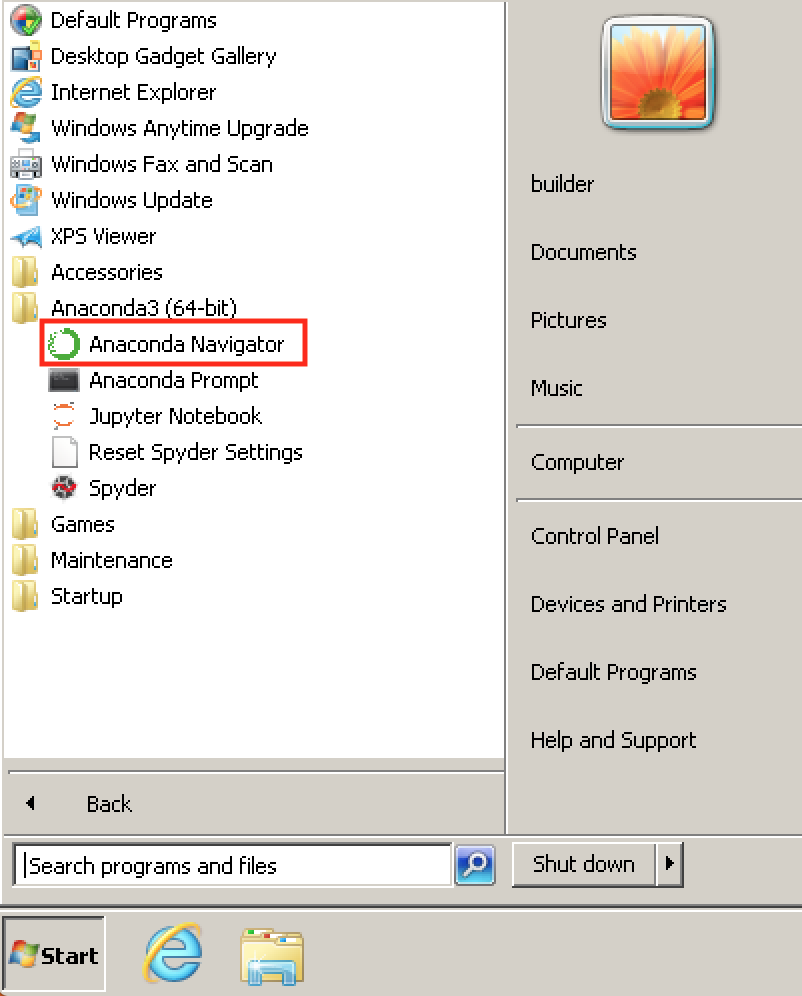
Or to install Anaconda without VS Code, click the Skip button.

NOTE: Installing VS Code with the Anaconda installer requires an internet connection. Offline users may be able to find an offline VS Code installer from Microsoft.

1. After a successful installation you will see the “Thanks for installing Anaconda” dialog box:

[](https://docs.anaconda.com/_images/anaconda-install-win.png)

1. If you wish to read more about Anaconda Cloud and how to get started with Anaconda, check the boxes “Learn more about Anaconda Cloud” and “Learn how to get started with Anaconda”. Click the Finish button.
2. After your install is complete, verify it by opening Anaconda Navigator, a program that is included with Anaconda: from your Windows Start menu, select the shortcut Anaconda Navigator. If Navigator opens, you have successfully installed Anaconda. If not, check that you completed each step above, then see our Help page.

[](https://docs.anaconda.com/_images/navigator-anaconda-prompt.png)

## Flask Setup

* + 1. To Install Flask Package.
    2. Run: conda install -c anaconda flask
    3. This will download and install all packages required for Flask API

## Run Python Code

* + 1. Open Conda Prompt and navigate to the place where the below file is placed.
    2. To set up that we need to run. Run the below command:  
       set FLASK\_APP=web\_endpoint.py
    3. To start the above API.  
       python -m flask run
    4. This will start the API on localhost:5000
    5. To test if the API is running execute GET API (http:///localhost:5000/)and see if its responses with Http Status Code of 200.
    6. If so the API is ready to be used.

# Appendix

## Key Terms

| # | Term | Description |
| --- | --- | --- |
|  |  |  |
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