BACHELOR OF COMPUTER APPLICATIONS

SEMESTER *5*

DCA3104

PYTHON PROGRAMMING

Unit 2

Environmental Set Up and Introduction

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1. INTRODUCTION

As we learnt, Python is an essential tool for developing web-based applications with large databases. Not only that, Python can handle external files with immense data and has the ability to analyses them with the least error and most efficiency. These features make Python a suitable choice for scientists who need to investigate the data for their experiments or evaluate the data obtained from observations. Python can examine the data and visualize it in a well-manageable manner.

STUDY NOTE

Anaconda Inc. was developed by Peter Wang and Travis Oliphant in 2012.

To enhance the potential of Python, various IDE or Integrated Development Environments have been developed. These environments make coding, testing, and debugging in Python much easier and intuitive. With the help of these IDE, people who do not have any past experience in coding can use Python and its features. An IDE comes with an editor responsible to hold and handle the code along with tools for building, execution, and debugging.

Anaconda can be termed as a distribution of the R and Python programming languages in scientific computing. It has applications in data science, predictive analysis, large-scale processing of data and machine learning. Anaconda aimed at simplifying package deployment and management. The distribution involves data-science packages for macOS, Windows, and Linux.

Anaconda Inc. developed the product and takes care of its maintenance. As it is an Anaconda Inc. product, it is also known as Anaconda Individual Edition and Anaconda Distribution. Package Management System Conda manages the various package versions of Anaconda. This package manager was rolled out as a stand-alone open-source package. The reason behind this decision was the usage of the package for things other than Python. There is a small and bootstrap version of Anaconda, which comprises only the Python, Conda, a few packages it is dependent on, and some other packages. The version is known as Miniconda.

The benefits of using Anaconda are as follows:

- The primary advantage is that it is open-source and free of cost.
- It has a collection of more than 1500 R/Python data science packages.
- Anaconda is famous for simplifying package management and package deployment.
- It creates an environment that makes the deployment of any project way trouble-free.
- It has tremendous community support. You can ask your queries out there, and someone will resolve them.
- Anaconda has gradually become the industry standard for training, development, and testing on a single machine.

What can you get along with Anaconda?

- Anaconda allows you the opportunity to libraries and dependencies with Conda.
- Users have the option to download from over 1500 R/Python data science packages.
- User can use NumPy, Dask, Numba, and Pandas to analyze data scalably and quickly.
- Train and build ML and deep learning models with Scikit-learn, Theano, and TensorFlow.
- Perform visualization with Bokeh, Matplotlib, Datashader, and Holoviews

1.1 Learning Objectives

After studying the chapter, you will be able to:

- *Understand the end-to-end installation process of Anaconda.*
- *Describe Anaconda's GUI and Anaconda Navigator.*
- *Discuss about various modules of Anaconda.*
- *Understand more about Anaconda Navigation and Anaconda Prompt.*
- *Describe how to run a simple code using Jupyter and Spyder.*

2. SYSTEM REQUIREMENTS

You need to ensure that all your system meets all the requirements before you proceed with the installation of Anaconda. Depending on whether you are using the free Anaconda distribution or you are an Anaconda Enterprise 4 user, the system requirements will be different. Let us look at the system requirements for both of them one by one-

Source: mrmint.fr

Fig 1: Anaconda

System Requirements for Anaconda Enterprise 4

Hardware Requirements

Without satisfying the hardware requirements, it will not be possible to move ahead with the installation. The requirements are-

- The RAM should be 32 GB or 16 GB of 1600 MHz DDR3 RAM.
- A CPU having the following features: 2 x 64-bit 2.8 GHz 8.00 GT/s CPUs
- Minimum storage of 300 GB. In the case of air-gapped deployments, the minimum storage size should be 600 GB.
- The user should have internet access to download all the files from the website Anaconda.org. Alternatively, the user's laptop or PC should have a USB drive containing all the required files. In the case of air-gapped installations, the user should also have alternate instructions.

Software Requirements

The minimum software requirements are essential to ensure the smooth functioning of the application. They are-

- The system should have MongoDB 2.6. It will be provided with the installation files.
- The user should have the Anaconda Repository license file.
- RHEL/CentOS 6.5 to 7.4, Ubuntu 12.04+. Additionally, Ubuntu users might need to install cURL.
- The user should have Linux system accounts. The following are required- Mongod (RHEL) or MongoDB (Ubuntu)
- The system should have access to the Anaconda server.
- Cron entry is required to start the repo on reboot.

Security Requirements

The security requirements ensure that the data is protected and no data-breach takes place. The security requirements are-

- An Open HTTP(S) port
- Edit privileges for SELinux policy (SELinux does not have to be disabled in the case of Anaconda Repository operation)
- Ability to make Iptables modifications. It is an optional requirement and depends on the user.
- The user can choose to have an SSL certificate. It is not mandatory to have it.
- Privileged access OR Sudo capabilities

Network Requirements

TCP ports will be required. Most of the below requirements are optional, and it is up to the user if he considers them as must-haves.

- Inbound HTTP: TCP 8080, 8443 (Anaconda repository)
- Optional Inbound SSH: TCP 22 (SSH)
- Optional Outbound HTTPS: TCP 443

- repo.anaconda.com
- anaconda.org
- conda.anaconda.org
- binstar-cio-packages-prod.s3.amazonaws.com
- 820451f3d8380952ce65-4cc6343b423784e82fd202bb87cf87cf.ssl.cf1.rackcdn.com

- An outbound Simple Mail Transfer Protocol: Transmission Control Protocol 25 (if not using AD/LDAP) email notifications. It is not compulsory to incorporate it.
- An outbound LDAP(s): TCP 389/636 for authentication integration. It is not a mandatory requirement.

Other Requirements

- A license file provided to you by Anaconda at the time of purchasing the product.
- The installation tokens for Binstar and anaconda-server channels provided by Anaconda while purchasing the product. It is not applicable for air-gapped installs.
- It is an optional requirement: Your Anaconda.org account credentials. It is not applicable for air-gapped installs.

System Requirements for Anaconda Individual Edition

It is mandatory to review the system requirements before installing the Anaconda individual edition. The requirements are-

- A minimum of 5 GB disk space is required to download and install Anaconda.
- License: It can be the one for free use and redistribution under the terms of the ../Eula.
- Operating system: Windows 8 or the latest one, 64-bit macOS 10.13+, or Linux, including Ubuntu, RedHat, CentOS 6+, and others.
- If your operating system is older than what is currently supported, you can find older versions of the Anaconda installers in the archived section.
- The system architecture should have the following features: Windows- 64-bit x86, 32-bit x86; MacOS- 64-bit x86; Linux- 64-bit x86, 64-bit Power8/Power9.

SELF-ASSESSMENT QUESTIONS - 1

1. A RAM of 16 GB will not suffice for the Anaconda installation. (True or False)
2. Anaconda is freeware and open-source software. (True or False)
3. Anaconda can run on _____ and _____ Operating Systems.
4. A minimum of _____ GB space is required to download and install Anaconda individual edition.
5. Is having an SSL certificate mandatory?

3. INSTALLATION OF ANACONDA

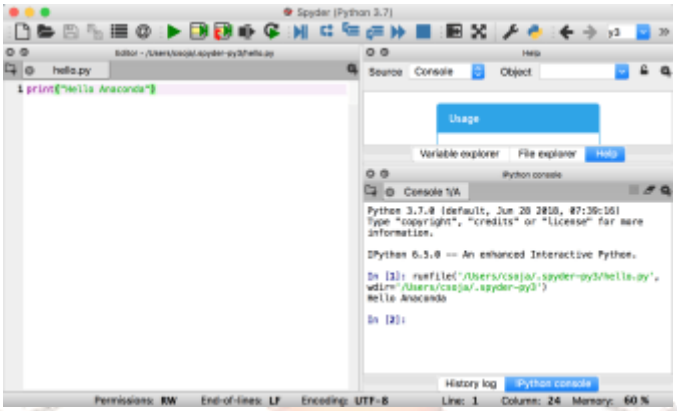
Once you are done verifying the system requirements, the next step is to start with the installation process. If you do not want several packages to be installed with Anaconda, you can choose to install Miniconda. It is a smaller version of Anaconda that includes Python, Conda, and its dependencies.

On macOS, Windows, and Linux, it will be the most convenient to install Anaconda for the local user. Thus, administrator permissions will not be required. The following are the steps to install Anaconda on your system-

STUDY NOTE

Anaconda is most popularly used for machine learning and data science.

1) Go to the https://www.anaconda.com/products/individual link to download Anaconda for your respective OS (macOS, Windows, or Linux). You can download the installer either for Python 3.7 or Python 2.7 (whichever is the latest). Also, you can download it for a 32-bit machine or a 64-bit machine as per your machine specifications.
2) The Anaconda setup would have downloaded in .exe format. Click on the file to open. Click on the 'next' button.
3) You should reach the license agreement page. Read the agreement and click on 'I Agree' and move to the next page.
4) You can choose to install Anaconda only for yourself or for all users. You will need administrative privileges to install it for everyone.
5) Choose the folder where you want to install it. You will be able to see the available space on the system and how much is required by the application.
6) Now, you reach the screen of advanced options. Firstly, you need to add Anaconda to the PATH environment variable of the system. Now, register it as the primary system Python 3.7. If you add Anaconda to the PATH, it will be found before any other installation. Click on the "Install" button.



Source: *Francesco Lelli*

Fig 2: Anaconda Editor

7) It will take some to extract the files and unpack the packages on the machine. The installation will be complete in some time. Click on the 'next' button
8) The next screen will inform you about PyCharm. Click on the 'Next button. The installation is complete. Click on the 'Finish' button.
9) Now, you will be able to see Anaconda in the Start menu. You can open a Jupyter notebook and create a new notebook.

SELF-ASSESSMENT QUESTIONS - 2

6. Anaconda can only be installed for local user. (True/False)
7. _____ is a mini version of Anaconda.
8. You will need _____ privileges to install Anaconda for all users on your system.
9. Miniconda includes _____, _____, and _____.
10. The extension of Anaconda software is _____.

4. ANACONDA NAVIGATOR

The Anaconda Navigator is a Graphical User Interface (GUI) that allows you to conveniently manage environments, Conda packages, and various channels without the need of using command-line commands. The navigator is included in the Anaconda distribution and allows you to launch various applications. Navigator can be used to search for packages on the website Anaconda.org, or in a local Anaconda Repository. It is available for macOS, Windows, and Linux.

What is the use of the Anaconda navigator?

To run, several scientific packages are dependent on particular versions of other packages. Data scientists often use several versions of many packages and use distinct environments to separate these different versions. The command-line program Conda is both an environment manager and a package manager. This feature helps data scientists in ensuring that each version of every package has all the dependencies it needs and works as per expectations.

Navigator is a convenient, GUI way to work with environments and packages without having to type Conda commands in the terminal window. You can use the navigator to find the packages you are looking for, install them in the environment, run the packages, and update them.

What does the application Navigator allow us to access?

By default, the following applications are available in the Anaconda Navigator:

- JupyterLab
- Jupyter Notebook
- VSCode
- RStudio
- Spyder
- Glueviz
- Orange 3 App

- PyCharm
- Anaconda Prompt (Windows only)
- Anaconda PowerShell (Windows only)

User having an advanced level of experience in Conda can build their applications as well. The simplest way to run a piece of code in Navigator is using Spyder. Navigate to the navigator home tab and click on Spyder. You can write and execute your code.

How to start the Anaconda Navigator?

The process to start the Navigator depends on the Operating System. Follow the below steps to start the navigator in different Operating systems:

1. **Windows:** Click on the Anaconda Navigator Desktop app from the Start Menu. Another way could be to search for Anaconda Prompt from the Start Menu and then type in the command anaconda-navigator.
2. **Linux:** Type in "anaconda-navigator" after opening the terminal window. The Navigator will open up.
3. **MacOS:** Click on the Anaconda Navigator icon from the launchpad. Alternatively, you can open the terminal from the launchpad and type in anaconda-navigator.

Activity I

Divide into groups in your class or among your friends. Base the division on the factor that which person owns a macOS, a Windows, and a Linux. Compare the interface of Anaconda in different operating environments.

SELF-ASSESSMENT QUESTIONS - 3

11. What should you type in the terminal window in macOS to launch the Anaconda Navigator?
12. In how many ways can you launch the Anaconda Navigator in Windows?
13. Can we work in Anaconda Navigator without having to type commands?
14. The Anaconda Navigator is a Character User Interface. (True or False)
15. Anaconda Prompt can only work on _____ operating software.

5. DIFFERENT MODULES OF ANACONDA

Modules refer to a file containing Python definitions and statements. Any file containing a Python code, for example, Abc.py, is known as a module, and its module name would be ABC.

Any package in Anaconda can be installed using the command "Conda install Package name". All packages are located in the package repository. Apart from the packages, the major components of Anaconda are listed below-

5.1 JUPYTERLAB

JupyterLab is a web-based UI (User interface) developed for Project Jupyter. JupyterLab allows users to work with activities such as Jupyter notebooks, documents, terminals, text editors, and several other components in an integrated and flexible manner.

One of the biggest advantages of JupyterLab is the option to arrange several documents side by side in the working area using splitters and tabs. Various activities and documents integrate seamlessly and thus enable the creation of new workflows which act as a push for interactive computing. A few examples of the same are-

- The Code Consoles provide temporary scratchpads for executing and running the code interactively. It behaves as major support for rich output. A code console can be connected to a notebook kernel which will act as a computation log from the notebook.
- Documents that are kernel-backed allow code in any format of a text file (Markdown, R, Latex, or Markdown) to run in a Jupyter kernel interactively. Outputs of notebook cells can be mirrored into a tab of their own. These tabs can be side by side with the notebooks. Simple dashboards are enabled with interactive controls along with a kernel.
- Multiple views of documents are allowed where viewers enable live editing of their documents which will be reflected in the documents of other viewers.

Another advantage of JupyterLab is that it allows handling and viewing data formats in various file formats like JSON, PDF, and CSV. You will also get the option to use key maps and customizable shortcuts on the keyboards.

5.2 JUPYTER NOTEBOOK

The Jupyter Notebook is popular for extending the console-based approach to interactive computing in a new direction. It provides a web-based application that can capture the end-to-end computation process. The process involves documenting, developing, and executing the code followed by communicating the results to the users. The Jupyter notebook comprises two components:

1. A web application: It is a browser-based tool made to author interactive documents that are a combination of computations, mathematics, explanatory text, and their media output.
2. Notebook documents: It is a representation of the content seen in the web application. It also includes the input and output results of the computation, images, representation of objects, mathematics, and explanatory text.

Notebook documents contain both the input and output of an interactive session in addition to the text that accompanies the code and is not meant for execution. Thus, Jupyter Notebooks can be considered as a computational record of the sessions. It also includes mathematics, explanatory text, and executable code. These documents are JSON files and can be easily shared with colleagues. As we are using Jupyter in a browser, our computer will be acting as the server. Hence, Jupyter does not need to send our data elsewhere.

5.3 Spyder

It is an open-source IDE (Integrated Development Environment) that has cross-platform integration to make scientific programming in Python easier. Several packages are integrated with the scientific Python stack. A few of them are SymPy, pandas, Cython, NumPy, and Matplotlib. Spyder is extensible with third-party plugins and supports interactive tools for data inspection. It also takes care to embed Python-specific introspection instruments and code quality assurance instruments. The primary features of Spyder are-

- It provides support for several IPython consoles.
- An editor with code completion, syntax introspection, and highlighting.
- A history log that takes a note of every command that the user enters.

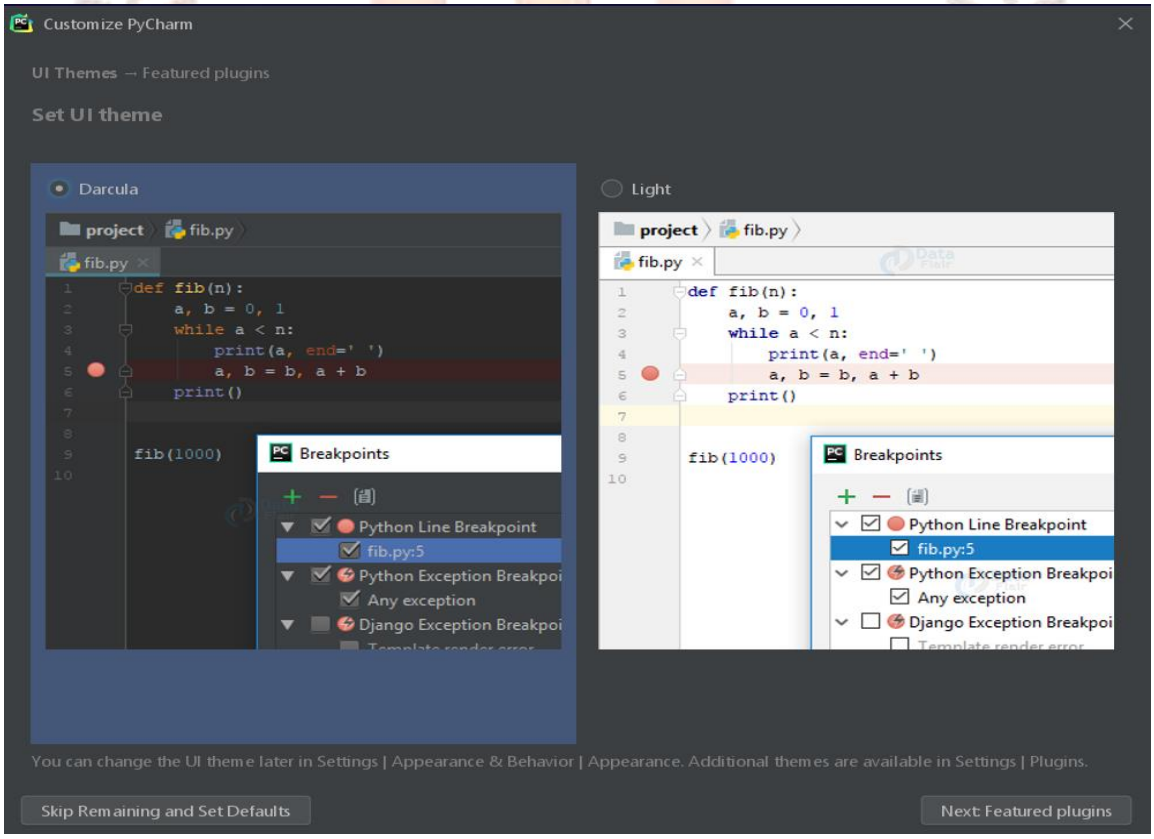
- A static code analysis.
- Spyder allows users to work on multiple development efforts concurrently.
- A help pane that can retrieve and render documentation on classes, functions, and methods.

5.4 PYCHARM

PyCharm is another popular IDE used for creating scripts in Python. It provides various essential tools that enhance the experience of developers while using Python. They provide an integrated environment to enhance the productivity of app development in Python. It is available in editions. The free and open-sourced one is called the Community version.

STUDY NOTE

PyCharm was developed especially for Python and is a fully-fledged IDE.



***Source**: Data Flair*

Fig 3: A simple program on PyCharm

Another free version is also available called Edu. It is used to learn programming languages for other technologies related to educational tools.

The paid version of PyCharm is called Professional. It is widely used by developers for code assistance, visual debugging, remote configurations, assistance, etc. The salient features of PyCharm are explained below.

Code completion: Through PyCharm you can experience intuitive code completion for built-in and external packages alike.

Code coverage: Files with extension .py can be run outside of PyCharm editor as well.

Package Management: The packages installed are displayed with appropriate visual representation.

Refactoring: Through refactoring, one can name one or more files at the same time. PyCharm makes this process much smoother.

Local History: PyCharm keeps track of the changes made in a file locally.

5.5 VS CODE

VS Code or Visual Studio Code supports code and development in various programming languages through its extension model. You can use the Python extension to use the VS Code for developing programs and scripts in Python. Here is a brief list of features provided by the VS Code when used for Python.

- It supports all versions of Python, including the classic Python 2.7 and the newer versions of Python 3.4 and above.
- It offers code completion with its unique IntelliSense.
- It enables the automatic use of virtual environments and conda.
- You can use Jupyter environments and Jupyter Notebooks for code editing.

- Visual Studio Code also provides themes through which you can customize the UI as per your choice.
- Varied language packs ensure that the experience of working on the VS Code is inclusive and localised.
- Code snippets
- Debugging Support

5.6 GLUEVIZ

Glue has become an integral part of the complete Python programming experience with its indispensable features and the ability to explore relationships between related datasets. One can explore the environment of object-oriented programming with the help of Glue. It is used to analyse astronomical data such as the formation of stars through clouds and comprehending medical data. prominent features of Glue are listed below.

Linked Visualizations: With the help of Glue, you can visualise data in the form of histograms, 2D, 3D images. scatter plots, etc. It also supports the brushing and linking paradigm. Thus, if data is selected in a graph, then it propagates to other sets of data.

Scripting Ability: You can integrate Python codes into Glue seamlessly. The Glue itself is written in Python. The integration can help in cleaning, input, and analysis of the data.

Data Linking: Glue has immense potential when it comes to linking two or more sets of different data. It uses logical links that relate to these data and with the help of them, visualizes it. The links can be specified by the programmer and are flexible.

5.7 ORANGE 3 APP

Being able to analyses and comprehend huge programs and data is the feature that makes Python so much more desirable than other programming languages. Orange 3 supports this feature of Python by providing a clean, free, and open-source platform that is powerful and holds the potential of analyzing

STUDY NOTE

Orange 3 is used by teachers and instructors to teach basics of programming.

large data and provides comprehensive visualizations for the chosen data. Orange 3 also supports basic machine learning skills and analyses.

The features of Orange 3 have been a boon for various fields of research where the scientists need to analyses the data obtained from a multitude of experiments. Here are some of its features that make it an easily approachable option.

Interactive Visualization: You can scatter plot, box plot, make decision trees, hierarchical clustering, linear projections, heat maps, and more.

Visual Programming: You do not have to dive deep into the coding part to make it work. The graphic user interface includes widgets that make analyzing datasets much easier.

5.8 RSTUDIO

RStudio is a data science tool that is free and open-source. RStudio amalgamates its features with Python to bring data scientists and users the best of both ecosystems. R language comes with a rich selection of libraries that make any kind of statistical analysis possible. There are around 12000 packages available in CRAN. Through the integration of R and Python, you can run scripts that handle a huge amount of data.

RStudio IDE has been created primarily for the use of data analysis and statistics. Though you cannot construct models using R, you have access and flexibility to using different libraries.

5.9 ANACONDA PROMPT (Windows Only)

Anaconda Prompt is a command-line shell where you can type in commands to perform a function instead of using the mouse or keyboard shortcuts. One can solve various problems while using Python with the help of Anaconda Prompt. Anaconda Prompt works similarly to Command Prompt as well. The difference is that when using Anaconda Prompt, you can still use Anaconda and conda commands from the prompt. You do not have to change the directories or the path.

Conda does not work in the command prompt. To update conda, you will have to use the Anaconda prompt. When you open Anaconda Prompt, you will find that it already has the locations of the commands and scripts that are saved on the system. You can run these scripts using the prompt.

5.10 ANACONDA POWERSHELL (Windows Only)

Anaconda PowerShell Prompt is a window shell environment in which you can run conda commands. On the Anaconda PowerShell, the user can run various PowerShell commands. These commands will not be recognized by the usual Anaconda Prompt.

SELF-ASSESSMENT QUESTIONS - 4

16. _____ is the Python module used by data scientists.

17. The paid version of PyCharm is _____.

18. _____ is used to extend console-based approach.

19. _____ contains Python definitions and syntax

20. Which of the following is not a Python stack module supported by Spyder?
    A. Stream API
    B. Pandas
    C. NumPy
    D. Cython

6. RUNNING A SIMPLE CODE PYTHON USING JUPYTER AND SPYDER

Now that the setup of the Jupyter Notebook is complete, let us try to run a simple program on it. Here are the steps that will guide you through creating a notebook and running a code in it.

Step 1: First, open the terminal and head to the directory where you want to save the notebook. Now, type the command Jupyter notebook. The program will initiate a local server or at any other specific port.

Step 2: Once the Jupyter Notebook window pops up on your screen, create a new Notebook.

Step 3: On the editor window, type the following command:

```
print ("Hello World!")
```

Step 4: Now, click on the cell where the code is written. Press SHIFT+ENTER. You can also click on the play button at the top of the cell.

Step 5: Once you run the code, the output will appear in the space at the bottom of the window. You can now press the stop button to stop running the code.

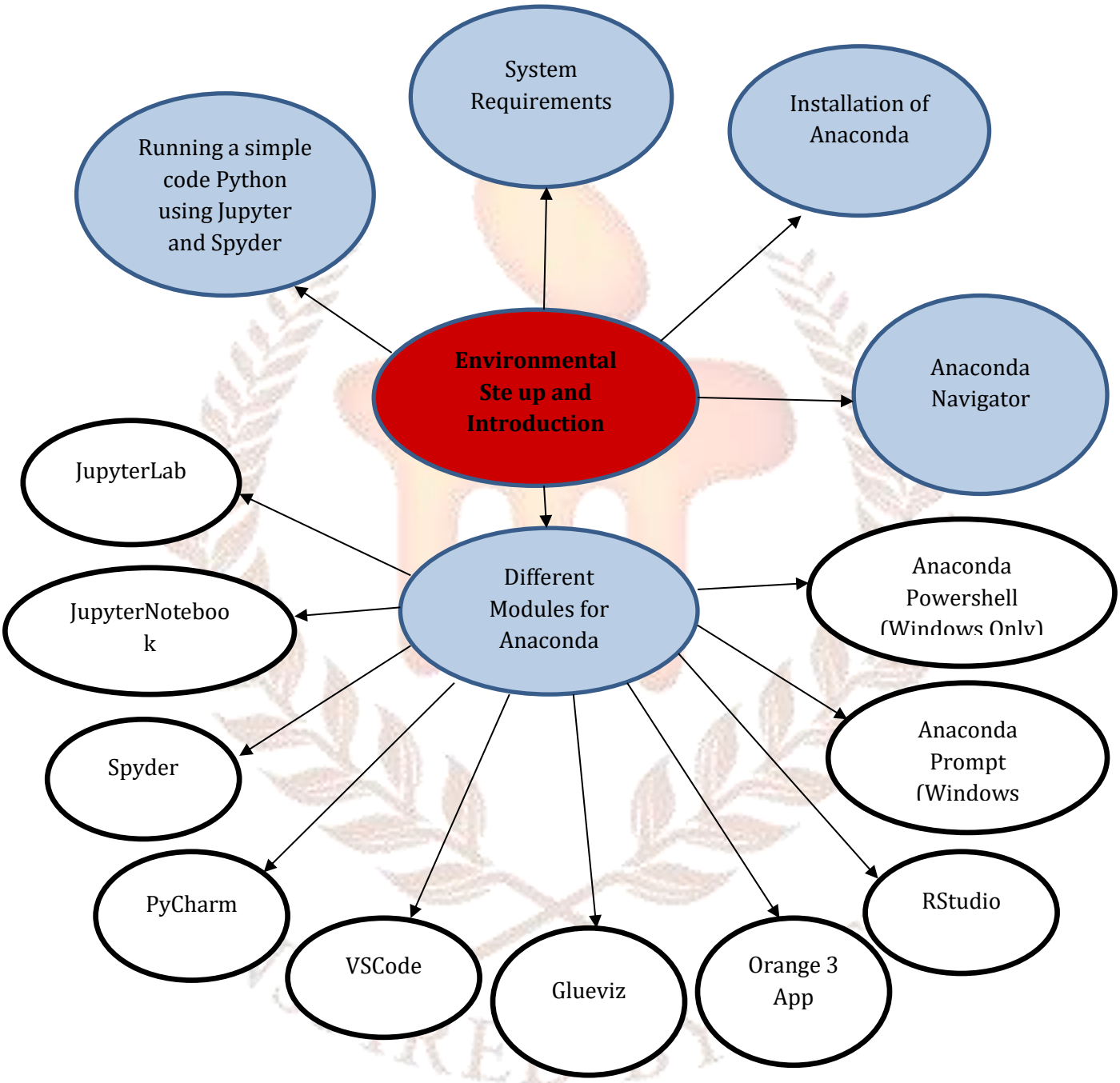


Fig 4: Conceptual Map

7. SUMMARY

- Anaconda is a distribution of the R and Python programming languages in scientific computing and has applications in data science, predictive analysis, large-scale processing of data and machine learning.
- Anaconda is famous for simplifying package management and package deployment.
- You need to ensure that your system meets the minimum requirements before you install Anaconda.
- The installation process remains pretty much the same irrespective of the OS you are using.
- Navigator is a convenient and a GUI way to work with environments and packages without having to type Conda commands in the console.
- JupyterLab allows users to work with Jupyter notebooks, documents, terminals, and text editors in an integrated and flexible manner.
- Jupyter Notebooks is like a computational record of the sessions. It also includes mathematics, explanatory text, and executable code.
- Spyder is an open-source IDE that makes scientific programming in Python easier.
- PyCharm makes the process of refactoring smoother.
- VS Code enables the automatic use of Conda and virtual environments.
- You can create a notebook and run a code using it.
- RStudio is a module of Python used for its rich features that are suitable for data scientists and analyists.
- Anaconda Prompt works similarly to Command Prompt and has its own sets of commands.
- Orange 3 App is used for visual representation of the data and by trainers to teach the students a programming language.

8. GLOSSARY

- **Scientific Computing:** It is a field involving multiple disciplines and uses advanced computing abilities to solve complex problems.
- **Data Science:** It is the usage of algorithms, scientific processes, and systems to extract knowledge and insights from structured and unstructured data.
- **Predictive Analysis:** It comprises statistical techniques from machine learning, data mining, and predictive modeling and analyzes historical facts to make predictions about events in the future.
- **Bootstrap:** It is an open-source CSS framework that contains JavaScript and CSS based design templates for navigation, forms, typography, and buttons.
- **IDE:** It stands for Integrated Development Environment. It is a software application that allows programmers to move ahead with software development. It consists of a source code editor, a debugger, and some in-built automation tools.
- **Kernel:** It is a program that is at the heart of the Operating System of the computer. It has control over everything in the system.
- **Open source:** It is the category of computer software where the source code of the software is released under a license. The license allows the owner to use, change, and distribute the software to anyone and for any purpose.

9. CASE STUDY

Using Python in developing school website

A school has recently set up and needs a website to expand their online activities such as offering online courses, study resources, and notices to the students and other aids for parents. They also need the website to accommodate the enrolment form for new students and submitting applications for other certificates.

The website needs to be scalable, easily navigable, and light-weight. A technical team has been set up that needs to determine the requirements of the school, download Python and understand its workings, determine the system requirements that will be needed to develop the code for the website. They will also have to install Python and its different execution modes. The team can employ the modules of Python available to make the task easier and faster.

***Source**-basicpy.com*

Discussion Questions:

1. Which modules will you suggest to be used for the development of the website if you were a part of the team?
2. Discuss why the technical team chose Python as the programming language to develop their code in?

10. TERMINAL QUESTIONS

SHORT ANSWER QUESTIONS

Q1) Mention any three advantages of Anaconda.

Q2) What is Miniconda?

Q3) What are default applications on the Anaconda Navigator screen?

Q4) How can we start the Anaconda Navigator in MacOS?

Q5) Use Jupyter to run a code that prints your name.

LONG ANSWER QUESTIONS

Q1) Explain any two modules of Anaconda.

Q2) What do you understand by IDE? Explain in detail.

Q3) Detail the uses of PyCharm.

Q4) What are the system requirements to download Anaconda?

Q5) State features of Spyder.

11. ANSWERS

1. False
2. False
3. Windows and MacOS
4. 5
5. No
6. False
7. Miniconda
8. Administrative
9. Conda, Python, its dependencies
10. .exe
11. Anaconda-navigator
12. 2
13. Yes
14. False
15. Windows
16. RStudio
17. Professional
18. Jupyter Notebook
19. Modules
20. A) Stream API

TERMINAL QUESTIONS:

SHORT ANSWER QUESTIONS:

Answer 1: The benefits of Anaconda are as follows-

- It is open-source and free of cost.
- It is famous for package deployment and management.
- It has become the industry standard for training, development, and testing on a single machine.

Answer 2: Miniconda is a smaller version of Anaconda. It includes Conda, Python, and its dependencies.

Answer 3: The default applications available in the Anaconda Navigator are:

- JupyterLab
- Jupyter Notebook
- VSCode
- RStudio
- Spyder
- Glueviz
- Orange 3 App
- PyCharm
- Anaconda Prompt (Windows only)
- Anaconda PowerShell (Windows only)

Answer 4: You can click on the Anaconda Navigator icon from the launchpad to open the Anaconda Navigator. Alternatively, you can open the terminal from the launchpad and type in anaconda-navigator.

Answer 5: print ("Name")

LONG ANSWER QUESTIONS

Answer 1: There are various modules of Python. These are developed to ease the process of development and debugging. Here are the two modules.

1. PyCharm: Created especially for Python, this module has an intuitive code completion along with various other features including debugging, refactoring, code coverage and more.
2. VS Code: Visual Studio Code can also be used to write and code scripts for Python. It analyses the data and provides visual aids for its better comprehension.

Answer 2: IDE are Integrated Development Environments that are developed for Python. These make the process of coding, debugging, and implementing a code in Python easier. They have inclusive features and are much more intuitive text editors. They are lightweight and are used by people with little experience in coding to analyses data or by people who are beginning to learn a programming language.

Answer 3: PyCharm is another popular IDE used for creating scripts in Python. It provides various essential tools that enhance the experience of developers while using Python. They provide an integrated environment to enhance the productivity of app development in Python. It is available in editions. The free and open-sourced one is called the Community version. The paid version of PyCharm is called Professional. It is widely used by developers for code assistance, visual debugging, remote configurations, assistance, etc. The salient features of PyCharm are explained below.

Code completion: Through PyCharm you can experience intuitive code completion for built-in and external packages alike.

Code coverage: Files with extension .py can be run outside of PyCharm editor as well.

Package Management: The packages installed are displayed with appropriate visual representation.

Refactoring: Through refactoring, one can name one or more files at the same time. PyCharm makes this process much smoother.

Local History: PyCharm keeps track of the changes made in a file locally.

Answer 4: It is mandatory to review the system requirements before installing the Anaconda individual edition. The requirements are-

- A minimum of 5 GB disk space is required to download and install Anaconda.
- License: It can be the one for free use and redistribution under the terms of the ../Eula.
- Operating system: Windows 8 or the latest one, 64-bit macOS 10.13+, or Linux, including Ubuntu, RedHat, CentOS 6+, and others.

- If your operating system is older than what is currently supported, you can find older versions of the Anaconda installers in the archived section.
- The system architecture should have the following features: Windows- 64-bit x86, 32-bit x86; MacOS- 64-bit x86; Linux- 64-bit x86, 64-bit Power8/Power9.

Answer 5: The prominent features of Spyder are listed below-

- It provides support for several IPython consoles.
- An editor with code completion, syntax introspection, and highlighting.
- A history log that takes a note of every command that the user enters.
- A static code analysis.
- Spyder allows users to work on multiple development efforts concurrently.
- A help pane that can retrieve and render documentation on classes, functions, and methods.

12. SUGGESTED BOOKS AND E-REFERENCES

Books:

- Eric Matthes (2016), Python Crash Course: A Hands-On, Project-Based Introduction to Programming.
- John M. Zelle (2009), Python Programming: An Introduction to Computer Science (Preliminary Second Edition).
- Mark Lutz (2011), Python Programming: A Powerful Object-Oriented Programming (Fourth Edition).
- Sebastian Raschka (2017), Python Machine Learning - Machine Learning and Deep Learning with Python (Edition 2)

E-References

- Python Programming Certification Training Course, last viewed on March 25, 2021 https://www.edureka.co/python-programming-certification-training
- Python Tutorials and Sample Programs, last viewed on March 25, 2021 https://www.w3schools.com/python/
- Integrated Development Environments, last viewed on March 25, 2021 https://wiki.python.org/moin/IntegratedDevelopmentEnvironments