CS 51 Computer Science Principles

Module 3: Data, Internet, Computer and Programming

Unit 3: Programming and Algorithms

LECTURE 8 PROJECT DEVELOPMENT

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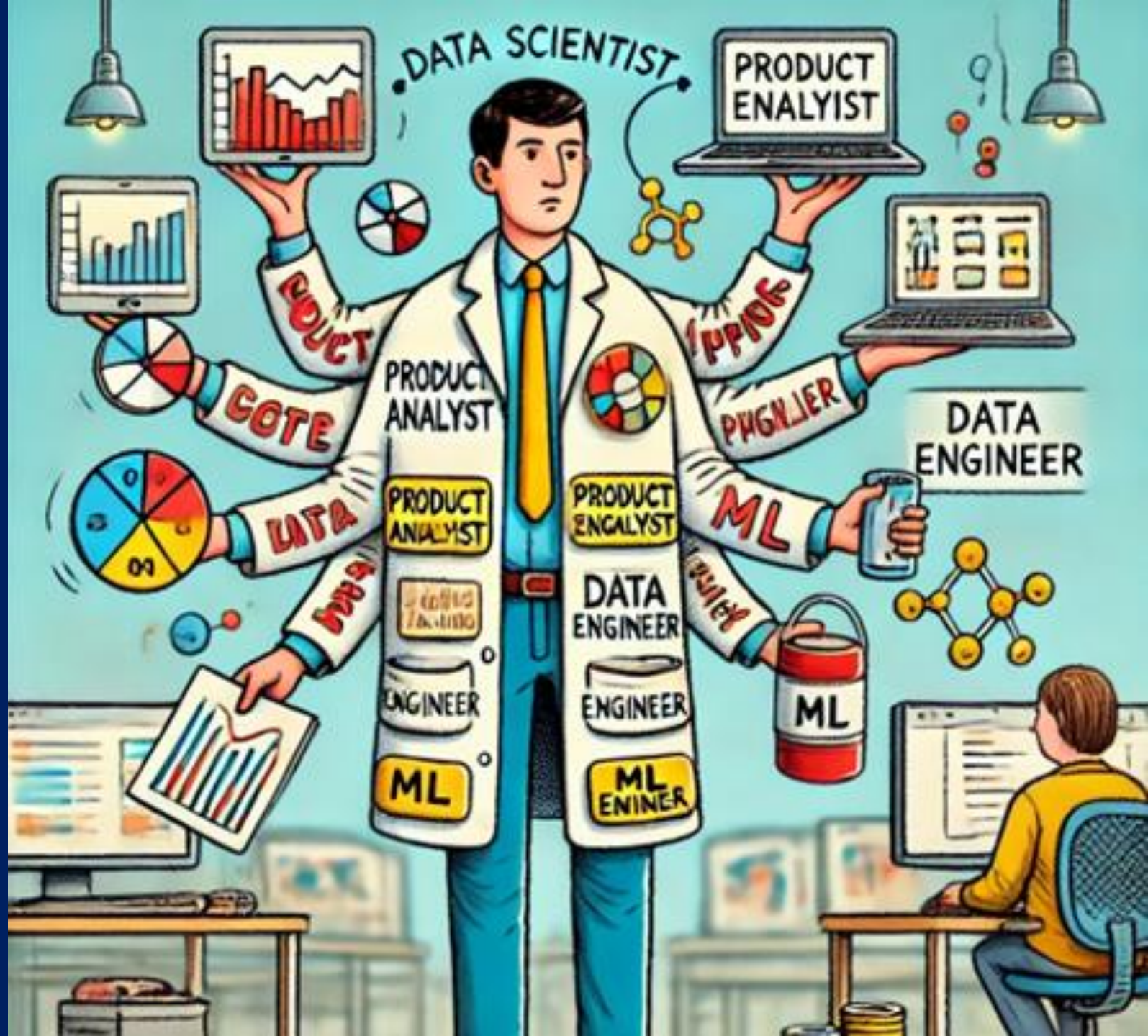
IEEE SENIOR MEMBER



Overview

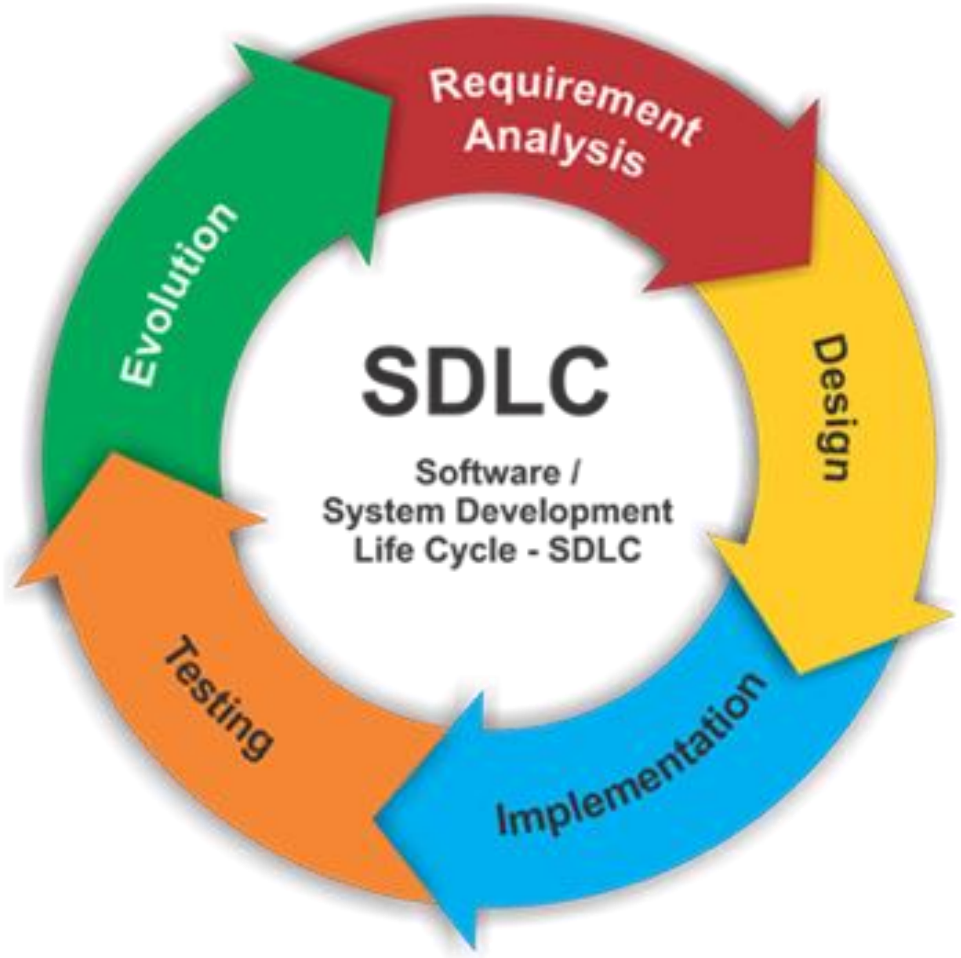
LECTURE 1

Objective:

- Project Development Life Cycle
- Hackathon and Create Task Activity on Code.org
- Pitch and Story Telling

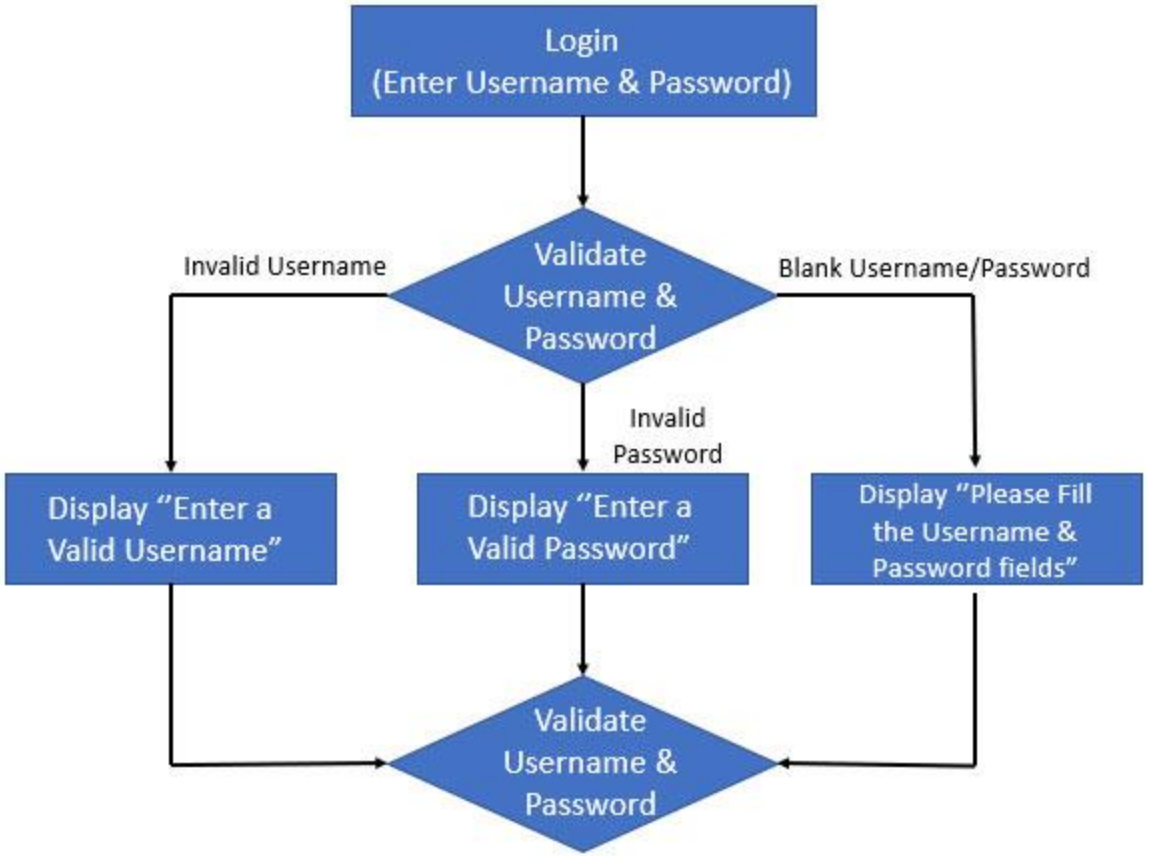
Project Development

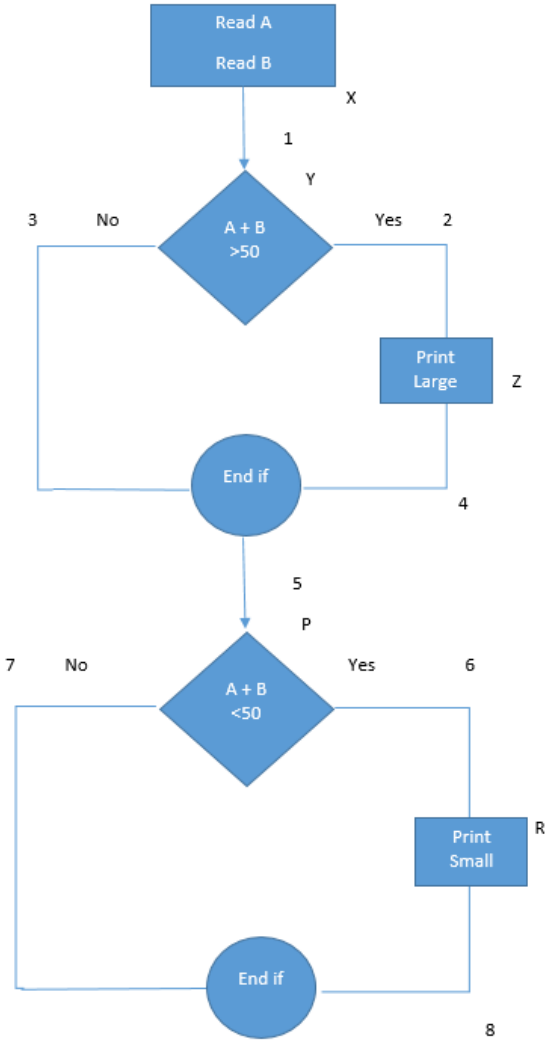
LECTURE 2


Requirement Analysis
Design
Implementation
Testing
Evolution
SDLC
Software / System Development Life Cycle - SDLC

Software Testing

LECTURE 3


Login
(Enter Username & Password)
Validate
Username &
Password
Invalid Username
Blank Username/Password
Invalid
Password
Display "Enter a
Valid Username"
Display "Enter a
Valid Password"
Display "Please Fill
the Username &
Password fields"
Validate
Username &
Password
www.educba.com


Read A
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1
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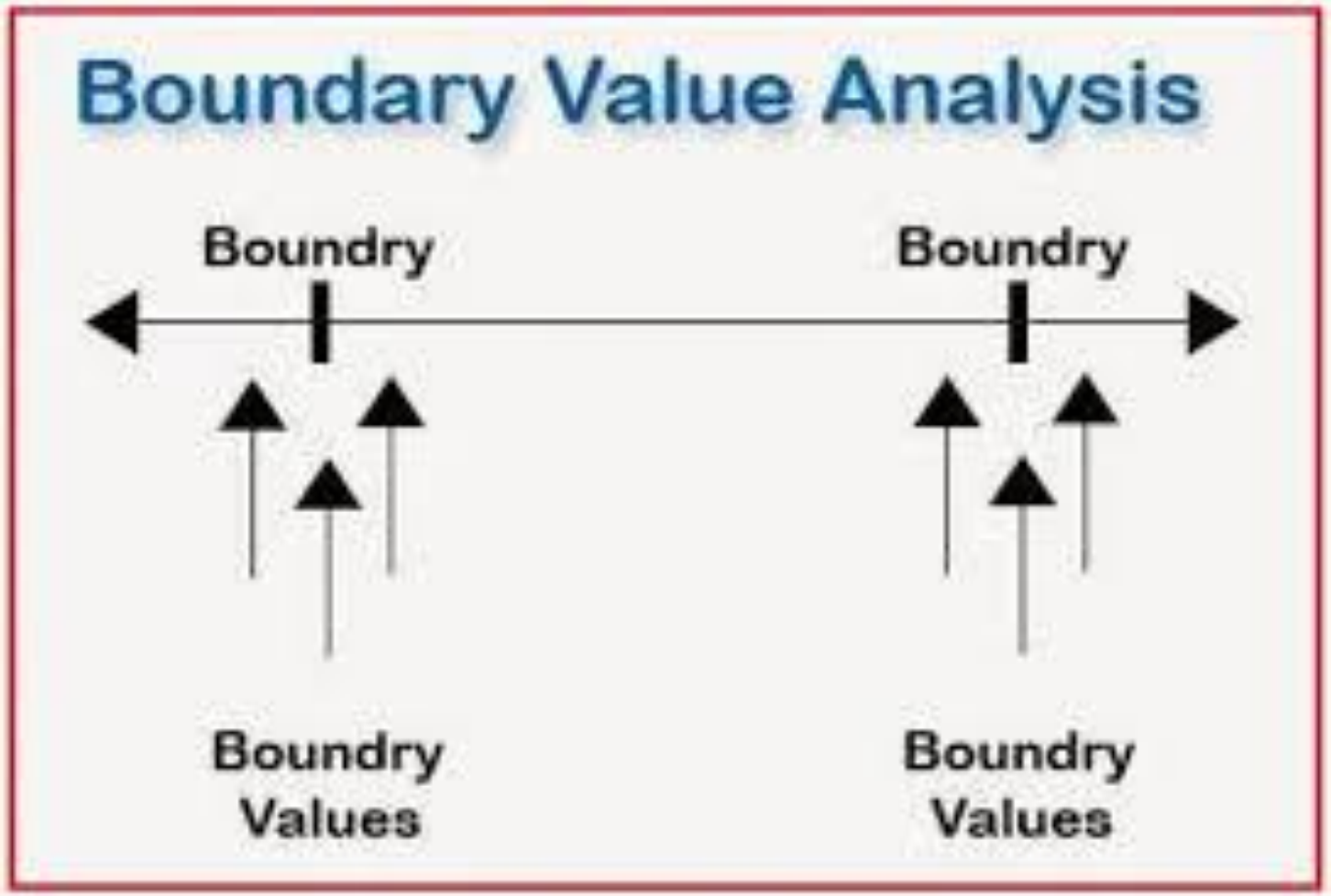


Boundary Value Analysis

Library

LECTURE 4

Libraries

- You don't have to define every procedure you use in a program. If you're using already-written code, you can import it into your program. In Python, you do this by importing the module it's contained in. This importing usually takes the form of a line of text at the top of your program that looks like this:

```
from location import module
```

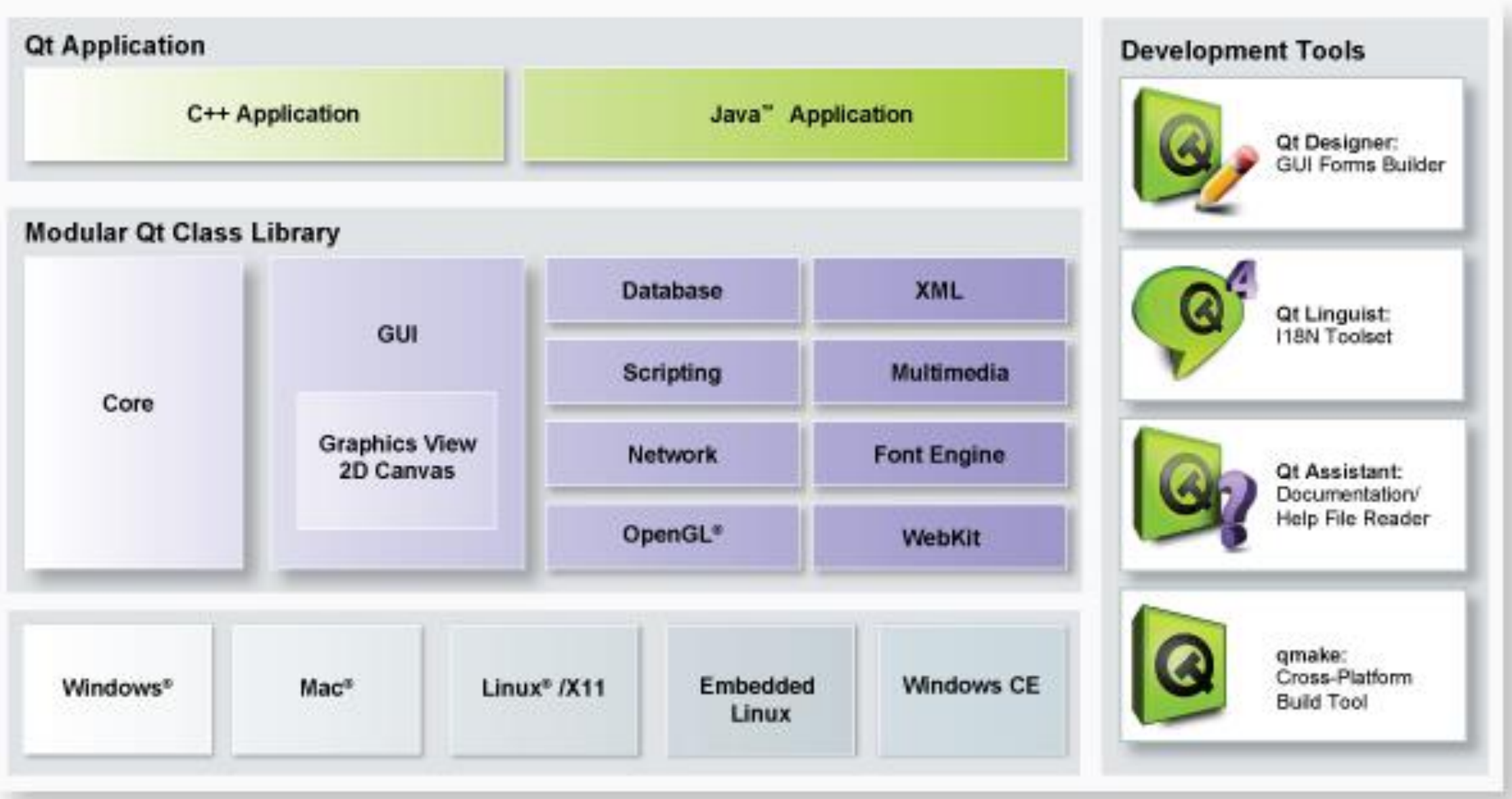
- There are several places where already-written modules come from.

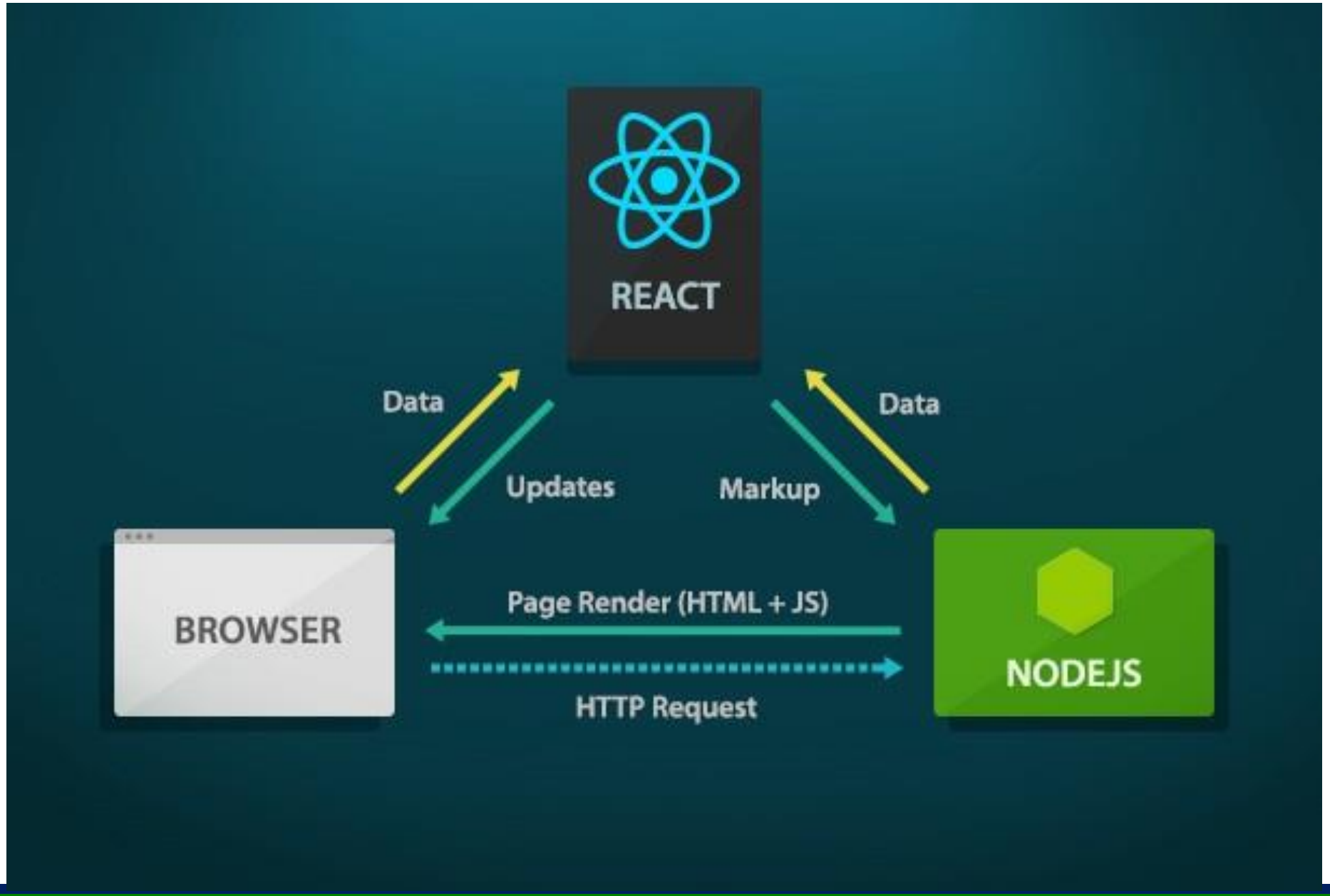
API Software Libraries

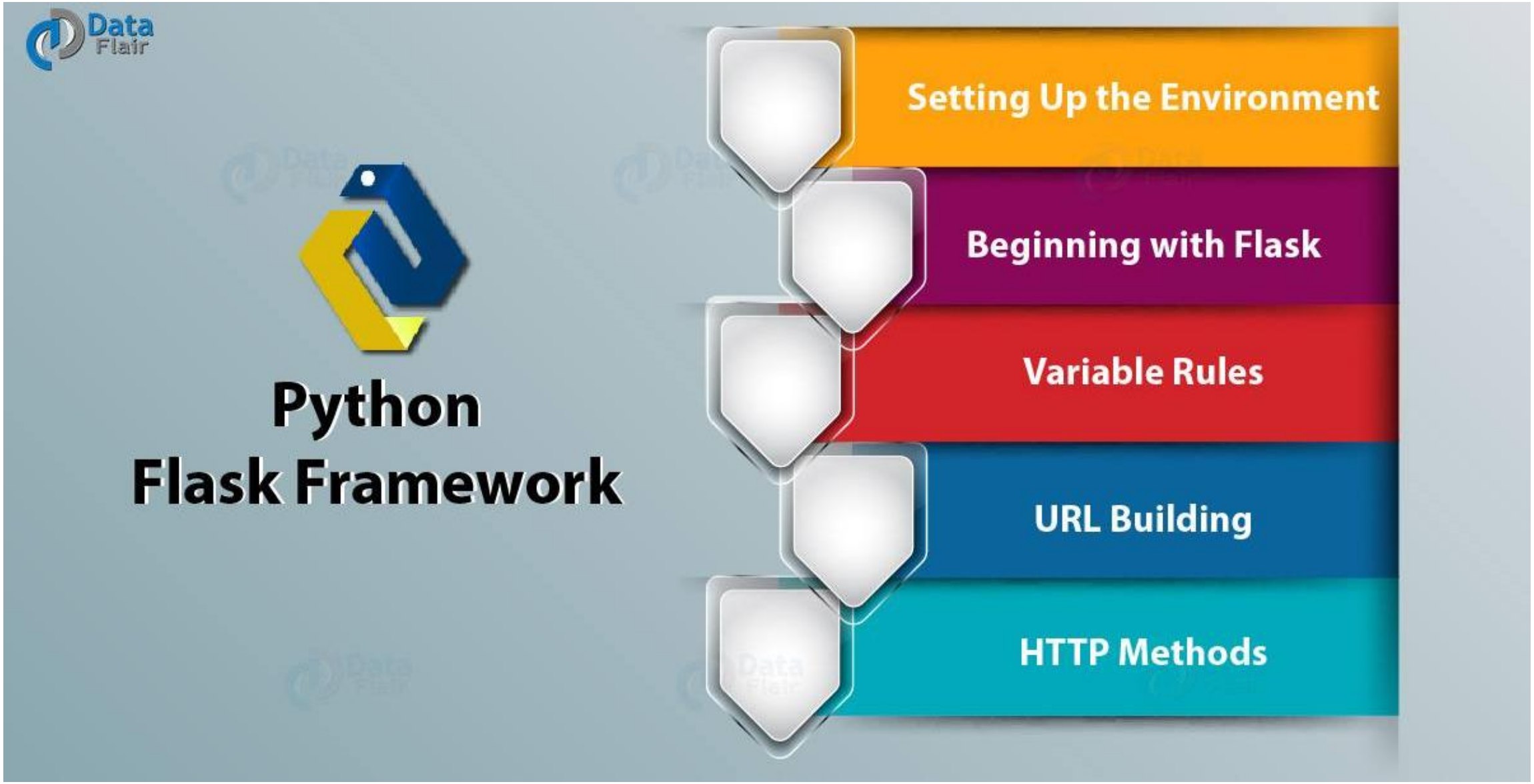
- A **software library** contains already-developed procedures that you can use in creating your own programs. You don't have to write new procedures to, for example, display images or find derivatives in your program; someone's already written those procedures and put them in a library for the public to use.
- There are libraries for everything under the sun. Here are some Python examples:
  - **Pillow** allows you to work with images.
  - **Matplotlib** allows you to make 2D graphs and plots.
- You can also **import** some of your own previously written code into a new program.

API Software Libraries

- An Application Program Interface, or **API**, contains specifications for how the procedures in a library behave and can be used. It allows the imported procedures from the library to interact with the rest of your code.
- In order to make the most of both APIs and Libraries, both need to be well documented. Libraries are, at their heart, a collection of other people's code, and it would be difficult to understand how the procedures should be used without documentation. APIs explain how two separate pieces of software interact with each other, and they also need documentation to keep this communication going.







Simulation

LECTURE 5

Simulations

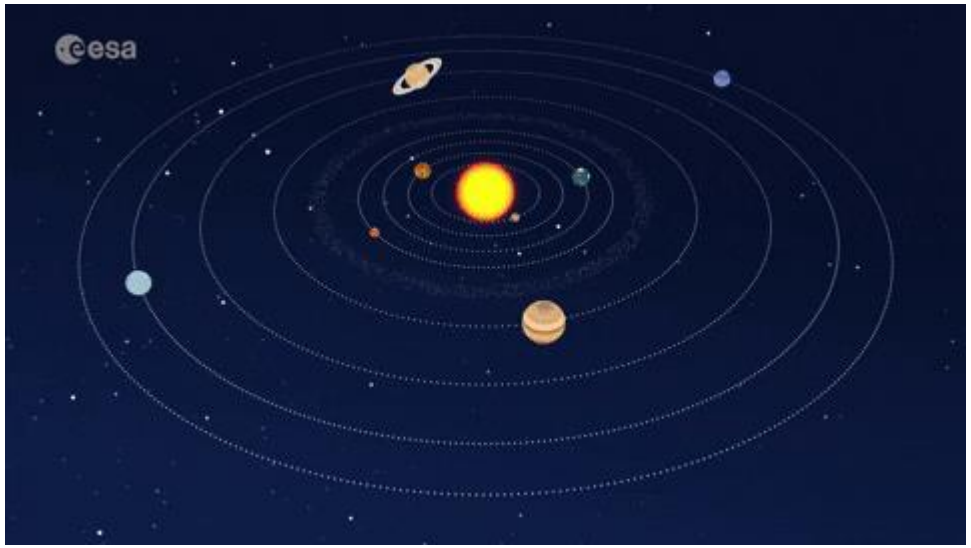
- **Simulations** are simplifications of complex objects (like the planets) or phenomena (like tornadoes) for a stated goal. They often use varying sets of values to reflect how a phenomenon changes. Using a computer, we can simulate everything from a **science lab** to a nuclear explosion to a zombie apocalypse, and computer simulations are used in industries like weather forecasting and financial planning.
- In order to develop a simulation, you have to remove certain real world details (like language barriers in a historical simulation event) or simplify how something functions.

Abstraction in Simulations

- Simplifying details to highlight a main point, where have we heard this before? 🤔
- That's right, simulations are an example of abstraction.
- There are many benefits to creating a simulation. They can be used to represent real-world events and conditions, like the force of gravity or the atmospheric conditions of a battle, so you can investigate and draw conclusions about them without dealing with some of the complications of the real world. Simulations are the most useful when observing the phenomenon in real life would be impractical, like if what you wanted to study was too big (Big Bang, continental drift) or too small (atoms, elements).

Abstraction in Simulations

- However, simulations also have some disadvantages. They run the risk of being too simple or conveying the wrong message about what you're trying to study (simulating the planets with tennis balls, for example, may lead people to think they're closer to each other and more similarly sized than they actually are.)



Abstraction in Simulations

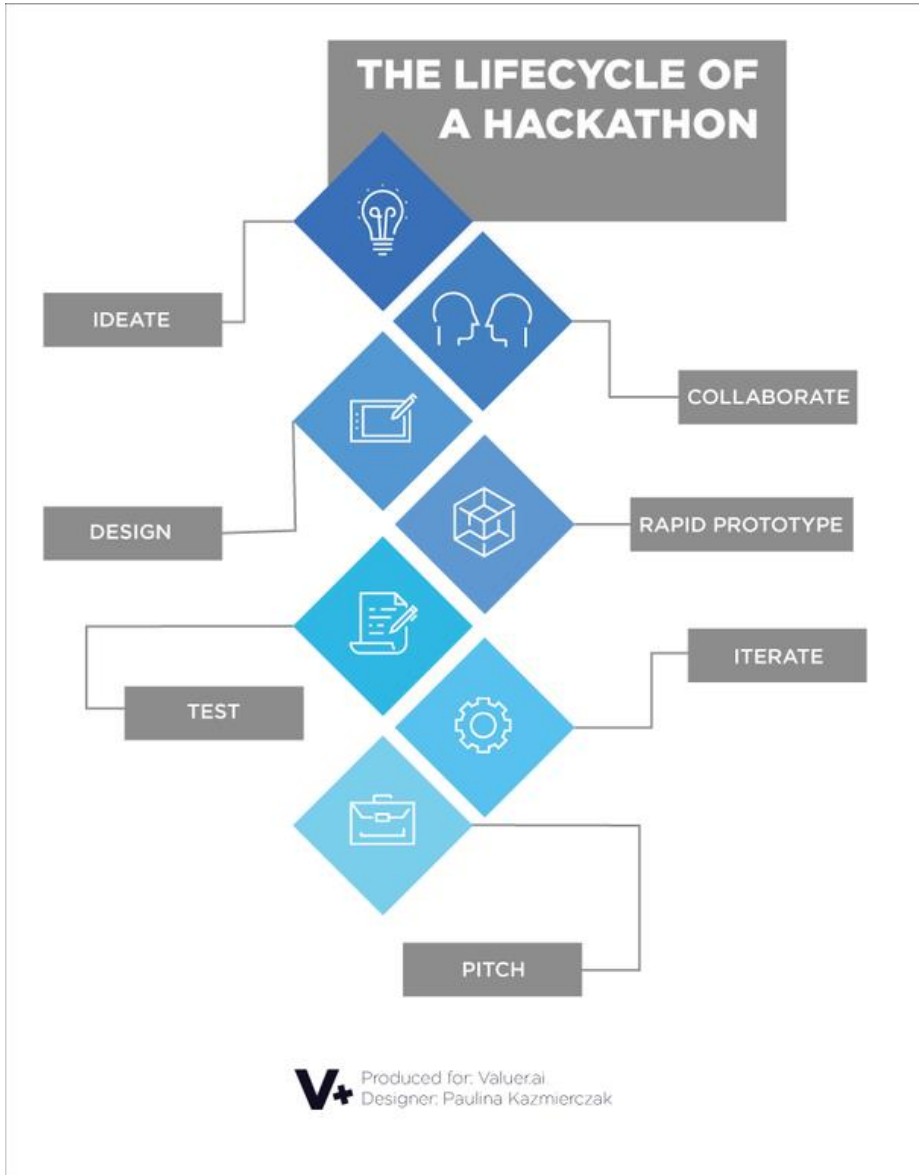
- Simulations may also contain bias based on what the simulation creator chose to include or exclude.
- Random number generators can help simulate real-world variability in these simulations: it's a little like rolling a pair of dice.

Hackathon

LECTURE 6

What is a hackathon?

- Hackathon is a tool to drive sustained innovation and crowdsource solutions to address pressing real-life business problems and social issues.
- A hackathon is typically a time-bound competitive event where participants collaborate to build proofs of concept and minimum viable products for a specific pre-defined problem or to innovate.

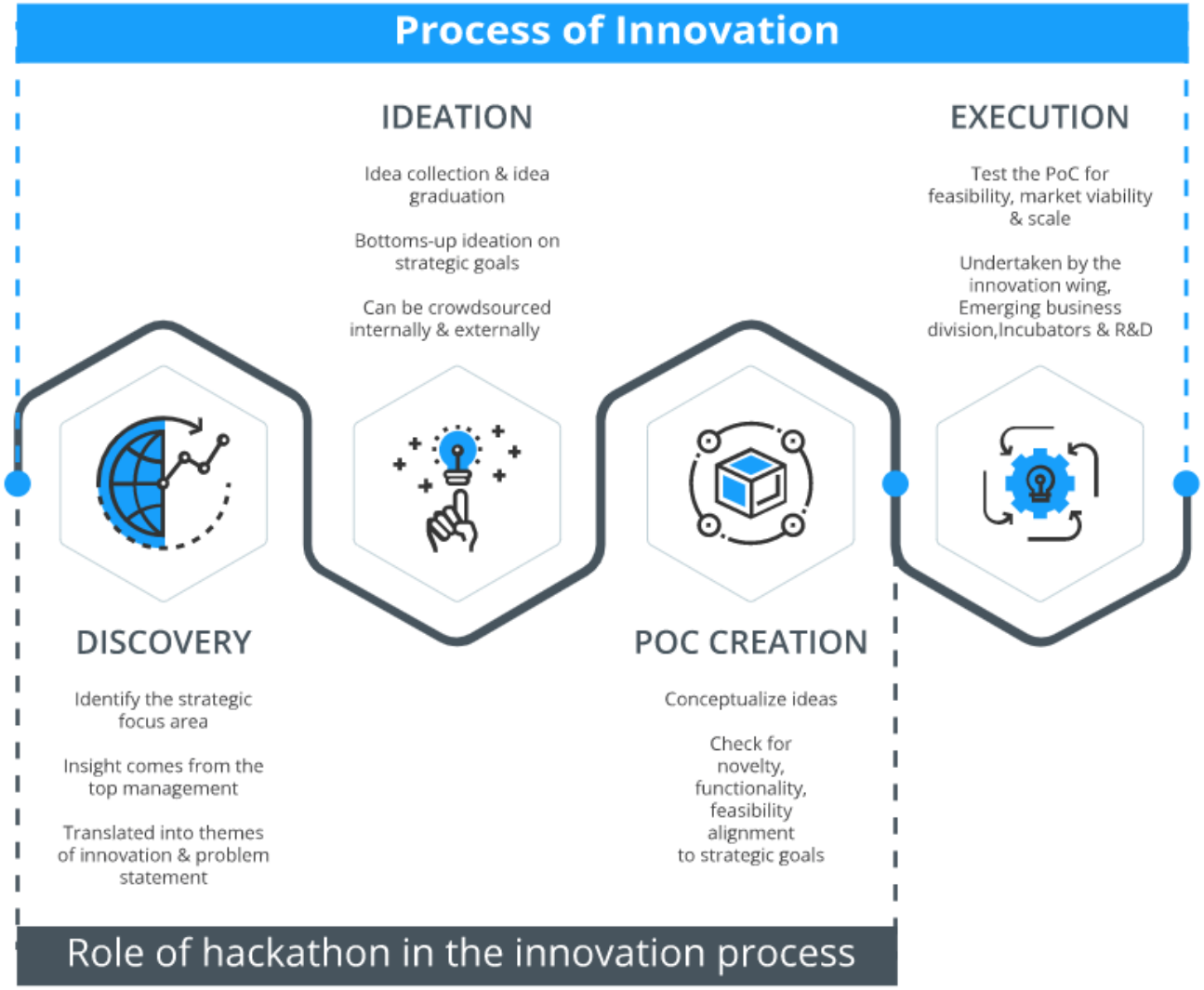


What is a hackathon?

HACKATHONS ARE EVENTS IN WHICH COMMUNITY MEMBERS COLLABORATE TO SOLVE PROBLEMS.

Why should you conduct a hackathon?

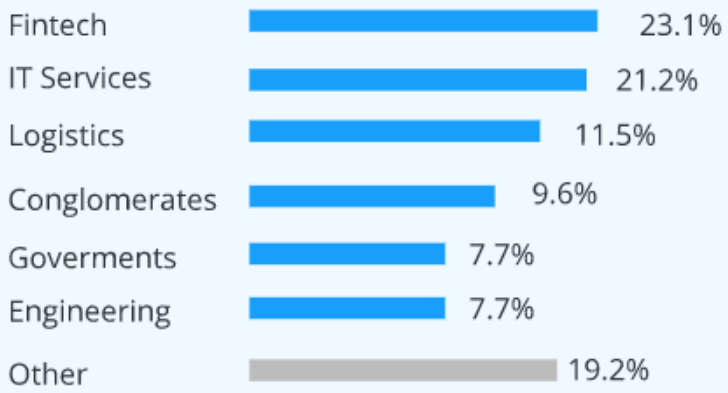
- Hackathons have some clear advantages over traditional innovation management processes. They are inclusive, agile, promote multidisciplinary collaboration, and have shorter innovation cycles that are better suited to addressing fast-changing consumer demands.
- Along with generating new ideas and future proofing a business, hackathons help de-risk product development, improve employee engagement and retention, find excellent talent, enable customer focused innovation and engagement, accelerate the speed of innovation and problem solving, enhance collaboration between teams, bring about cost savings through R&D, and build community, brand, and leadership.



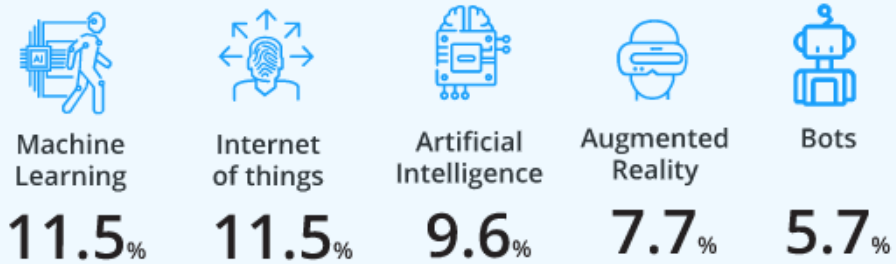
Process of Innovation

HACKATHONS BY SECTORS

In 2017, hackathons were a top innovation channel for fintech. Last year also saw more govts crowdsourcing solutions than ever before



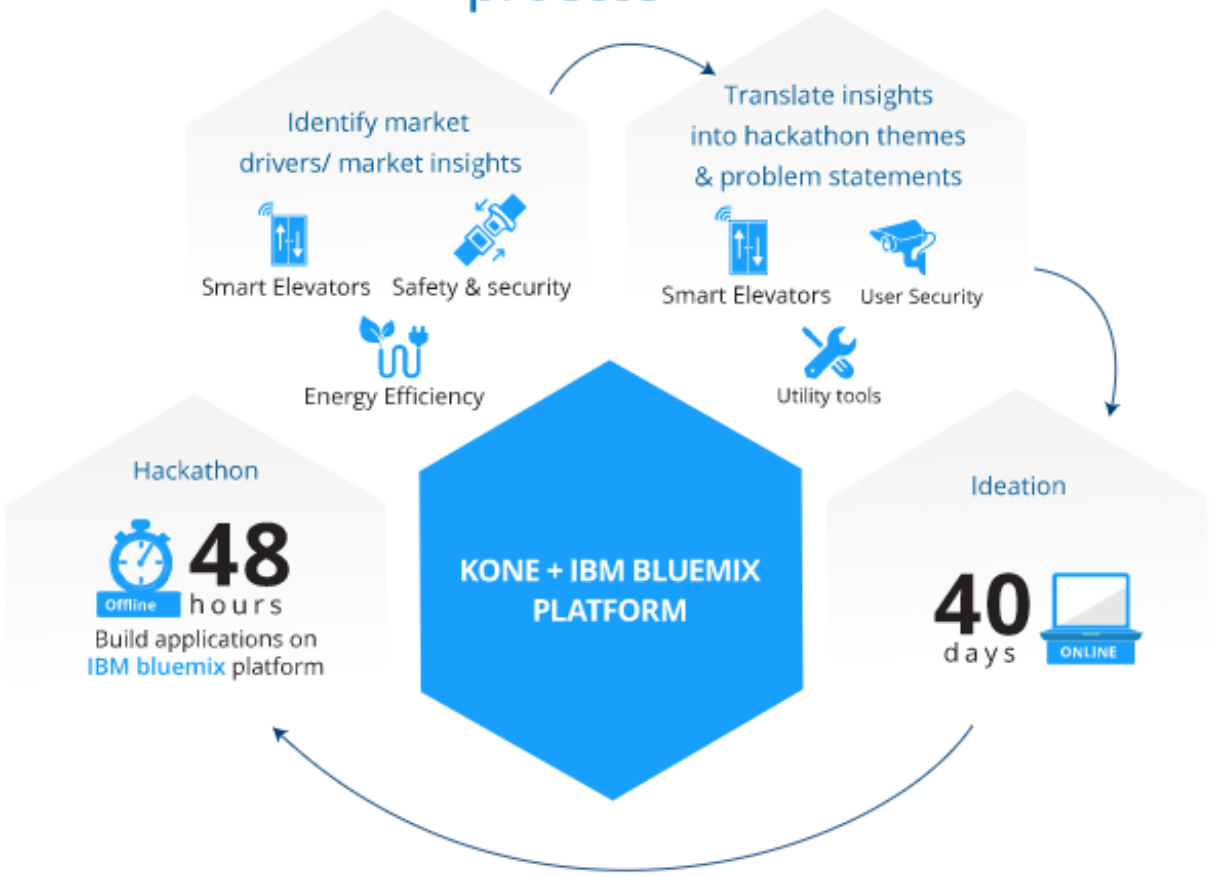
TOP 5 TECHNOLOGIES



What are the benefits of internal hackathons?

- **Establish a process of creative ideation:** The only way you can be consistently innovative is when the pace at which you are generating creative ideas and testing prototypes is higher than the pace at which your external factors are changing.
- **Rapid prototyping:** More experiments allow you to test out a large set of hypotheses and conducting not-so-perfect experiments also means that the cost of failure is low while giving you many insights. Internal hackathons are the perfect environment for rapidly prototype and test validity and feasibility before full implementation.
- **Jump start product roadmap:** Hackathons help to quickly check the feasibility of some of the ideas that can be taken up in the immediate roadmap. The dedicated time that one gets during the hackathon along with the competitive spirit and adrenaline rush can accelerate product development.
- **Come up with a future roadmap list:** Even though all ideas generated at a hackathon don't get implemented, they can become a good reference list for future road-map discussions.
- **Promote cross-functional collaboration across engineering and non-engineering teams:** This can facilitate collaboration between different teams but also give engineering teams a better perspective on the customer and make the non-engineering teams more vested in the product.

Open Innovation process



What are the benefits of external hackathons?

- Exploring new technologies
- Driving business innovation
- Sourcing incubation programs
- Creating potential startups
- Branding of products or an organization
- Creating solutions for social causes
- Analyzing data to make predictions
- Rewarding innovative thinking

How do you choose to engage?

- In this type of hackathons, a company engages people within and outside the organization.
- The invites are often influenced by the themes and goals that are set.
- According to Gartner, “CIOs can use external hackathons to change culture, improve customer experience, find new revenue opportunities, reduce costs, engage new ecosystems, and improve talent management.”

Onsite Hackathon

Online Hackathon

Hybrid/ 2-Phase Hackathon

Sample Timeline

It can be hard to know what to schedule into your hackathon, so here's a guide:

▼ Key times ▼ Team-related ▼ Host-related

Friday

The first day is all about laying the groundwork for a successful event; get everyone excited and on the same page.

- 6:00 PM — Registration and snacks
- 7:00 PM — Opening remarks
- 7:30 PM — Defining the problem
- 8:00 PM — Ideas pitch
- 9:00 PM — Form teams
- 12:00 AM — Building closes

Saturday

The second day is full of activity. Keep everyone on track with planned check-ins, breaks, and inspiring speakers.

- 8:00 AM — Doors open
- 8:30 AM — Breakfast
- 10:00 AM — Team check-in
- 12:00 PM — Lunch
- 12:30 PM — Speaker 1
- 5:00 PM — Dinner
- 6:00 PM — Mentor Feedback
- 7:00 PM — Speaker 2
- 12:00 AM — Building closes

Sunday

The third (and often final) day of a hackathon can fly by! Make sure everyone is aware of final presentation times, and be sure to announce the solutions at the end of the event.

- 8:00 AM — Doors open
- 8:30 AM — Breakfast
- 10:00 AM — Team check-in
- 11:00 AM — Lunch
- 3:00 PM — Presentations due
- 4:00 PM — Dinner
- 6:00 PM — Presentations start
- 7:30 PM — Winners announced
- 8:00 PM — Event ends

Source: Booz Allen Hamilton

Most Popular Gifts


Gift Certificate


Tablet


Smart Watch


Go Pro


Amazon Echo

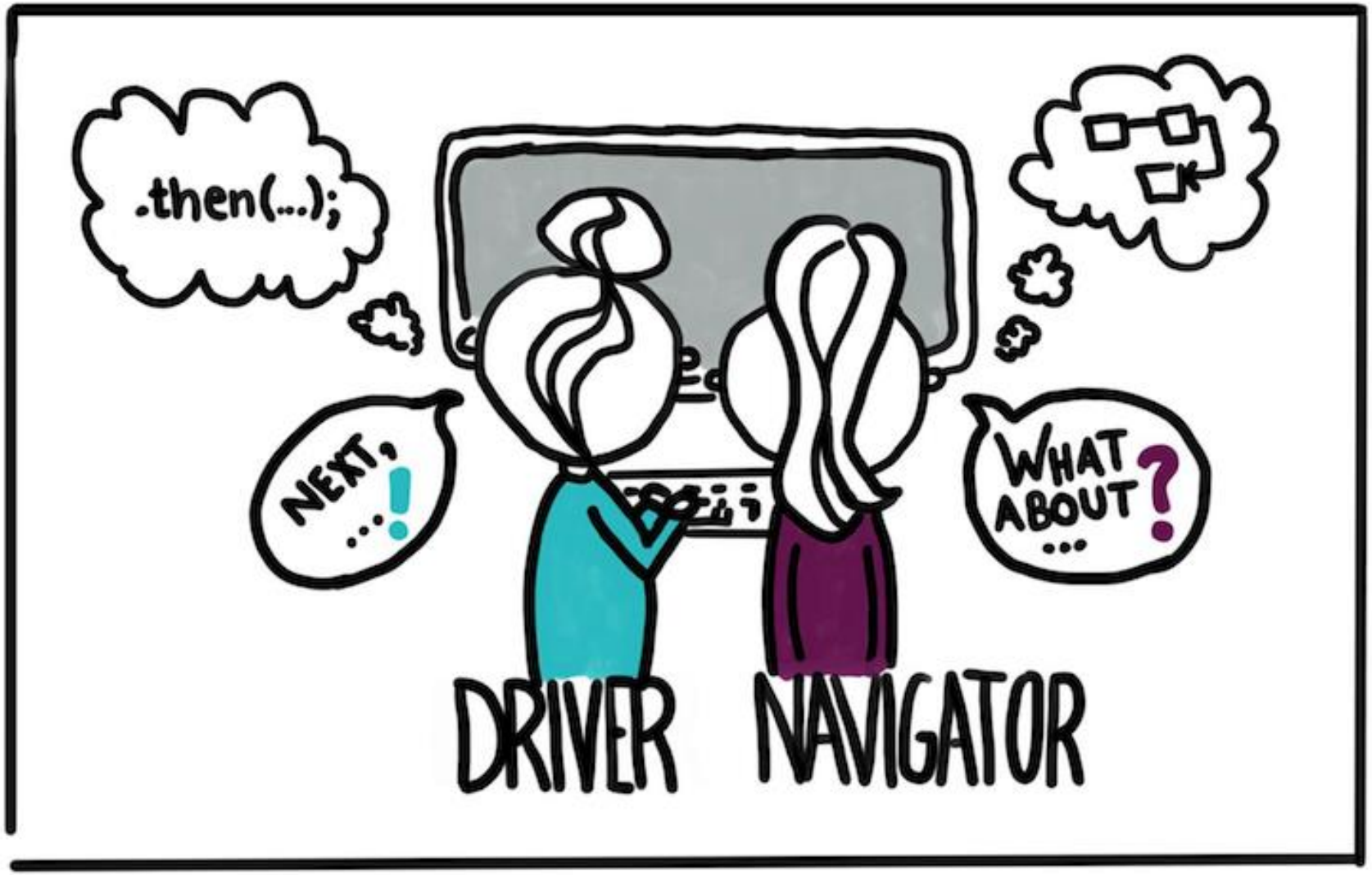

Gaming consoles


Drones


Portable hard drives

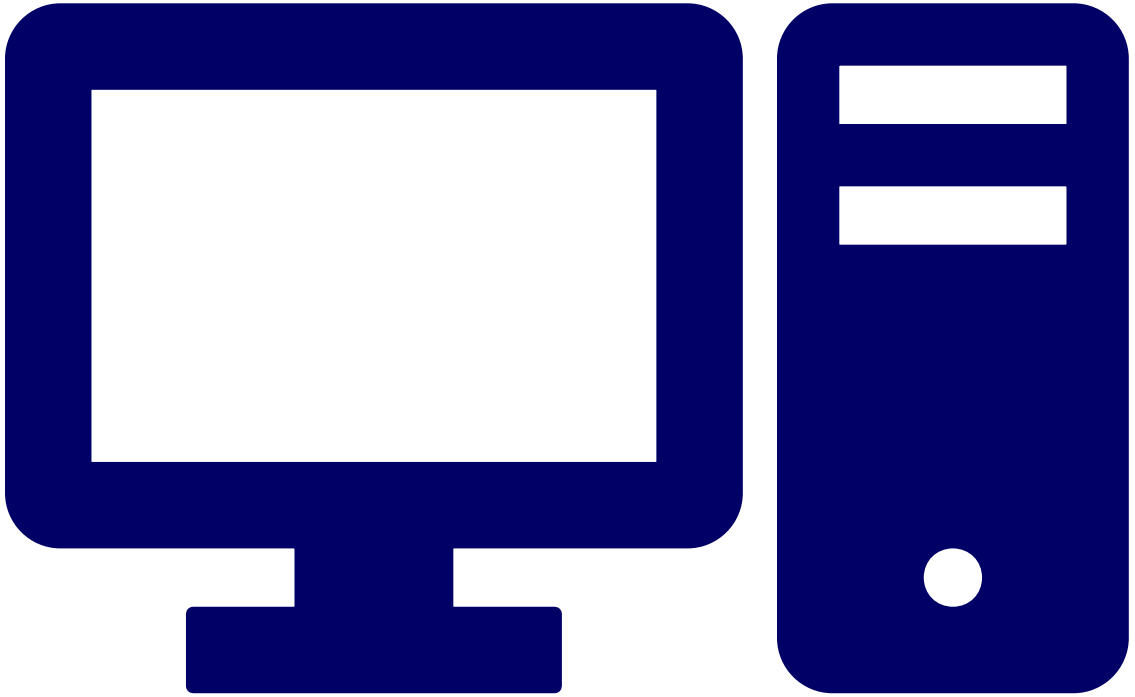

Apple MacBook


Paid Holidays


.then(...);
NEXT, ...!
WHAT ABOUT ...?
DRIVER
NAVIGATOR

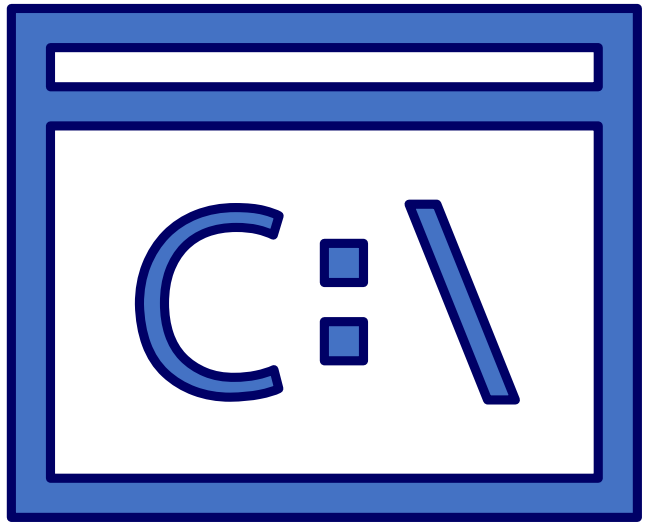
5 ROLES NEEDED ON EVERY HACKATHON TEAM

Collaboration



Hackathon

LESSON 13-17 [CODE.ORG]



Create Task

SECTION 2 – UNIT 8 [CODE.ORG]

Unit 9 - Data ('22-'23)

In this unit learn how data analysis helps turn raw data into useful information about the world. Learn how to use data visualization to find patterns inside of data sets and learn how this data analysis process is being used in contexts like open data or machine learning to help make decisions or learn more about our world. In the unit project, you'll analyze a dataset of your choosing and present your findings.

Teacher resources | Printing Options | View calendar

For your owned section:

APCSP 2023 Banana ✔ Assigned

Unit 9: Data

Lesson 1: Learning from Data

In this lesson students explore the "What's Going on in this Graph?" site in order to tell a "data story" which explains both what the data shows and why that might be. Following this, students are introduced to the concept of metadata and look for the metadata of datasets on App Lab.

1 Exploring Metadata

2 Check For Understanding

View Lesson Plan

Student Resources

Send to students

Rate this Lesson

Visible | Hidden

Business Pitch

LECTURE 7

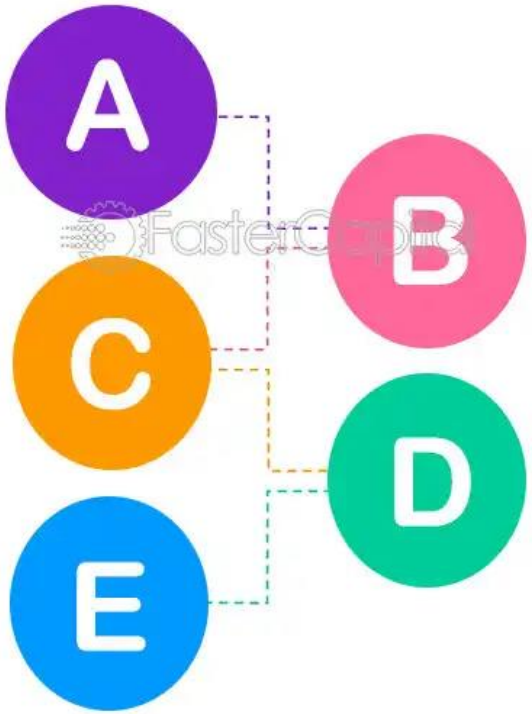

1
2
3

What is a hackathon and why is pitching important

Know your audience

Use storytelling and emotion

Practice and rehearse



Have a clear and concise message

Have a strong opening and closing

How to win the **Hackathon**?

You need a great … **strategy**!

You definitely need a great idea, but you also need an even better strategy: rapidly execute, build a functional prototype and prepare an impressive pitch of your concept.

The following few slides will help you to:

- **Handle your ideas**
- **Setup the right team**
- **Get ready for rapid prototyping**
- **Get ready for presentation and pitch**

What are the Hackathon out there?

LECTURE 8

Upcoming High School Hackathons in 2025

A curated list of high school hackathons with 738 events in 29 states + 18 countries.

Organizing a hackathon? Hack Club is here to help.

This year, we've got $500 grants, fee-free usage of HCB and an incredible community of organizers.

kaggle

Data Science Competition

Start-to-Finish