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Capstone Briefing

Agenda

210 min

Section 1: Introduction to Capstone Company: Qinet	25 min
Section 2: Sharing of Capstone Briefing Deck	40 min
Section 3: Understanding RFM, Churn Analysis and what good looks like	40 min
Break	15 min
Section 4: Git & GitHub Briefing	90 min
Section 5: Practitioner Sharing	30 min

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Client background | Qinet is a tech company that runs a B2B e-commerce platform

Overview

A team of FMCG industry specialists and A.I. technology providers that are committed to connect business with AI & implement the right technology and AI solutions to give their clients a competitive advantage.

Specialty

The Qinet Retailer App - It is a B2B ecommerce platform meticulously crafted to streamline the order placement process for FMCG retailers. Additionally, it acts as a direct channel for distributors to promptly communicate updates on new product launches and promotional offers to retailers

Other Details*

Employee Size	Year Founded	Total retailers
11-50 Employees	2021	1200+

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Amid intense market competition, Qinet wants to focus in understanding their retailer segments and behaviour…

The client wants to:

- Move beyond traditional dashboards to measure key financial metrics
- Gather detailed understanding of retailer profiles
- Identify retailers who are about to reduce their engagement with platform before completely disengaging

…it wants to get insights from historical transaction data to segment retailers and identify those in the verge of soft churn

The client wants to leverage data to:

- Prepare a business performance dashboard to track the financial metrics, historical and forecasted sales trends, and deep-dive views for top retailers
- Segment existing customers into various personas based on their purchase patterns
- Build a soft churn prediction model to identify retailers who are likely to reduce their engagement

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Sharing & Q&A from Capstone Partner – QINET

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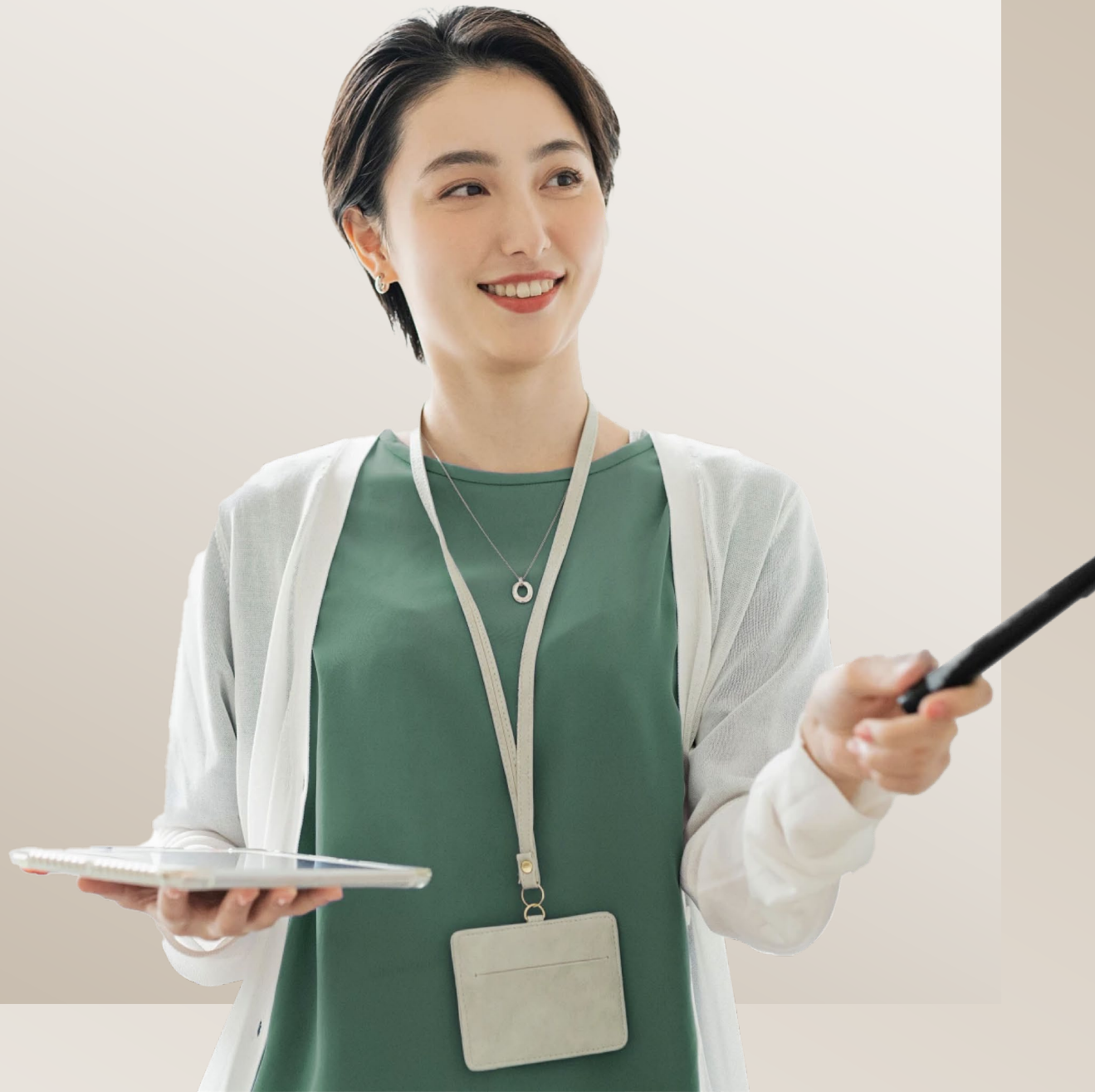
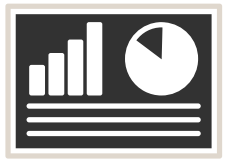
Sharing of Capstone Briefing Deck



What needs to be done | Help the client solve its business challenge using your data analytics skills

Learners are expected to construct the following:



Power BI Dashboard

Prepare a dashboard to analyze key business performance metrics

Customer Segmentation & Soft Churn Prediction

Perform customer segmentation & build soft churn model to predict retailers who will disengage

Client-friendly PowerPoint Presentation

Present actionable recommendations and findings backed by analysis

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You will be provided with transactions data of daily sales and quantity at SKU level from Jan 2021 to Dec 2024.

Datasets

- Transactions_qra.csv

Field Name	Description	Example
DATE	Date of sale in YYYY-MM-DD	2024-01-01
SKU_CODE		3995ffe6b5892f165984fa2555649ae9d0174753
PRODUCT_CATEGORY		Oral Care
BRAND_NAME		Colgate
RETAILER_CODE		241abc9502c0ac90e9938a269dbfa9a2bbc54ef7
RETAILER_NAME		Retailer 1
RETAILER_TYPE		CHAIN
DISTRIBUTOR_CODE		A201
DISTRIBUTOR_NAME		Distributor A
DISTRIBUTOR_TYPE		Exclusive
PRICE_SOLD	Price after any discount / offer	9
QUANTITY_SOLD	Quantity in Units / Pieces	50
INVOICE_VALUE	Amount in SGD	450
LIST_PRICE	Actual Price	10.1

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Your analytics workflow should always tie back to key questions to solve for potential business impact

Analytics workflow steps	Customer Segmentation	Churn Prediction	Data Visualization	Forward Looking Roadmap
Key questions to solve for	How to increase the volume of transactions for various customer segments?	How to intervene and convert disengaged retailers to re-engage?	What is the MoM/YoY growth in volume sold for top retailers?	How to efficiently manage marketing strategies, customer segments and re-engage customers in the future?
Suggested analyses	Perform Kmeans / RFM (Recency, Frequency and Monetary Value) analysis on the data	Build soft churn model to identify retailers who show attributes of disengagement using Logistic Regression / XgBoost	Create dashboard in Power BI reflecting the sales trend for historical data using different calculated KPIs and to visualize different customer segments	Create a future looking roadmap for Qinet to manage customer segments more efficiently and to devise retention strategy for retailers showing disengaging attributes
Expected deliverables	• Methodology details and customer segments in Excel	• Methodology details and list of retailers disengaging and their attributes in Excel	• Dashboards to showcase sales trend • Visualizations that help analyze the customer segments created in the previous step	• Ideas arounds future looking roadmap
Supporting Tools	Excel, Python, PowerPoint	Python, Excel, PowerPoint	Power BI	PowerPoint
Potential business impact	E.g. Increase transaction by X% through customer segmentation strategies	E.g. Increase transaction by Y% through retention strategy for early prediction of retailers churning	E.g. Projected sales of $X and volume trend for the next Y months	E.g. Total sales uplift and increase in volume transaction by $X and Y% through actions X, Y & Z

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Analytics workflow & Guiding principles

Analytics workflow steps	Customer Segmentation	Churn Prediction	Data Visualization	Forward Looking Roadmap
Guiding principles*	• Gather and clean historical sales data. • Explore Kmeans clustering and RFM analysis for segmentation. • Calculate Recency, Frequency, and Monetary scores for each customer to assess their value and engagement. • Define criteria to segment customers and assign segment labels based on their RFM scores. • Associate customer engagement with tailored marketing and engagement strategies to enhance targeting and effectiveness.	• Transform and prepare data for Churn Prediction • Perform feature engineering from the existing data • Build baseline model Logistic Regression and try out other models like Xgboost etc. to compare the performance of the model. • Identify the retailers who are about to soft churn from the predictive model. • Identify the most valuable retailers and devise retention strategies and re-engage the retailers.	• Develop a Power BI dashboard to visualize overall business performance • Showcase overall retailer view (Top retailers, popular product categories, Average order value etc) • Perform a sales trend analysis for last 2 years of data and present the next 90-180 days of forecast for Top 3 SKUs for Top 3 retailers • Create relevant visuals to show the segmentation done during the analysis	• The last step of any analysis is to have a future looking roadmap that consists of ideas Qinet can execute to manage their customers more efficiently • Suggestions around retention strategies for different segments • Identify potential customers and create strategies to convert low end customers(at risk/ churn) to higher segment • Learners are also required to come with a prioritization framework for different strategies based on cost, ease of implementation

*Non-exhaustive

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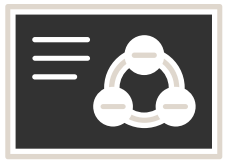
What needs to be submitted: 2 files

.pbix file

Power BI Dashboard(s)

Reflecting sales trend and financial metrics for top SKUs and visualizing customer segments created*



.pdf file

Client-friendly PowerPoint Presentation

Presenting actionable recommendations and findings backed by analysis

\+ (Optional) Any other supporting documents / sheets / files

Submission deadline

xx:xx pm (SGT)
Xx xxxx 2024

Submission method

Send files to TA via email

* Non-exhaustive

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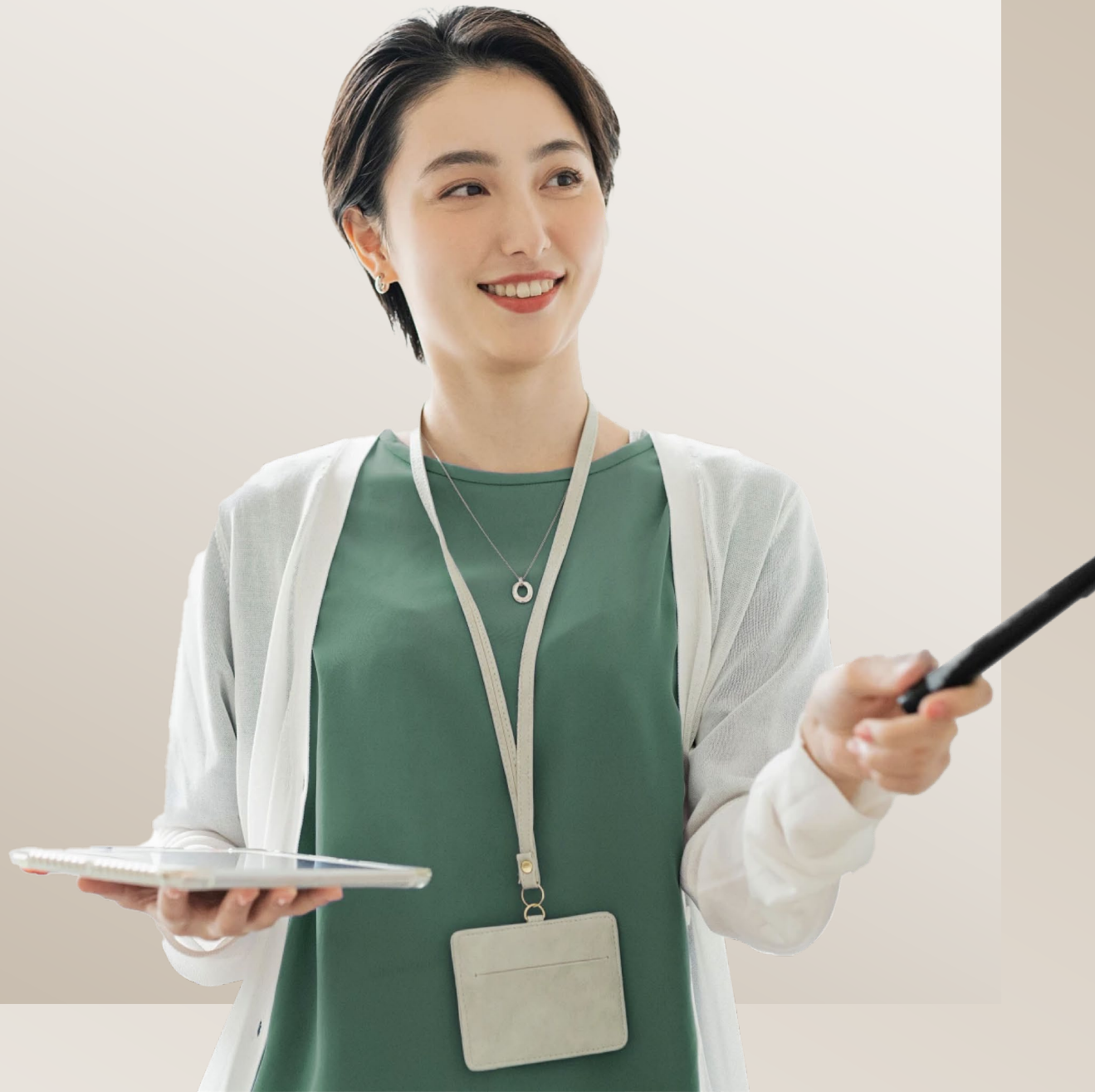
Understanding RFM and Churn



Rule based clustering

Rule based clustering

What is RFM

RFM, which stands for Recency, Frequency, and Monetary Value, is a popular marketing and customer segmentation technique used by businesses to analyze and categorize their customer base

It helps companies to:

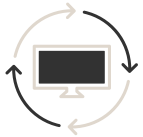
- Understand customer behavior
- Identify the most valuable customers
- Tailor marketing strategies to specific customer segments

RFM Metrics

Recency

The freshness of customer activity

e.g., time since last activity



Frequency

The frequency of customer transactions

e.g., the total no of recorded transactions

Monetary Value

The willingness to spend

e.g., the total transaction value

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RFM analysis leads to Customer Segmentation as shown with examples here

Sample segments (Illustrative)

Current CK Segmentation	Potential Customer Segment	Activity
VIP View	Most Important customers	Bought recently, buy often and spend the most across divisions and channels
Core View	Loyal Customers	Spend good money with CK and often
	Potential Loyalist	Recent customers, but spent a good amount and buy often
	Steady Loyalist	High frequency, but low average basket size
Prospects	New Customers	Bought most, but not often
	Promising Customers	Recent shoppers, but haven't spent much
Lapsing View	Customers Needing Attention	Above average recency. frequency and monetary values. May not have bought very recently
	About to churn	Below average recency, frequency and monetary values- Will lose them if not reactivated
	At Risk of churning	Spent big money and purchased often, but long time ago. Need to bring them back!
Lost View	Hibernating Customers	Last purchase was long back, low spenders and bought seldomly
	Lost Customers	Lowest recency, frequency and monetary scores

Segment	Description	Avg Order Value	Last Purchase
HVC	High Value Customer	>800$	>12 Mon
MVC	Medium Value Customer	>400$ & <800$	>8 Mon & <12Mon
LVC	Low Value Customer	<400$	<8Mon

Cluster	Description	Attribute 1	Attribute 2	Attribute 3
Sophisticated fresher	Frequency of purchase is less, demonstrate low cross sell	xx	xx	xx
Fixed traditionalists	Purchases similar products on every visit, avg order value does not change much		xx	
Value conscious novices	Very sensitive to price changes, low avg order value			xx
Large spenders	High frequency of purchase, large order value	xx	xx	

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Churn Analysis

Predictive Analytics

Churn Prediction in Retail

- A churn prediction model predicts customers that are likely to cancel a product/service subscription (Hard Churn) or decline in engagement (Soft Churn)

- The full cost of churn includes both lost revenue and marketing costs involved with replacing those customers with new ones

Target Customer Profile is created out of two broad sources:

Interaction with the firm like average transactions, # of transactions, average purchase frequency, average spend, etc.

Focus of project

External information such as Share of Wallet, customer risk flags, firmographics, competitors' data, macroeconomic, bureau data, etc.

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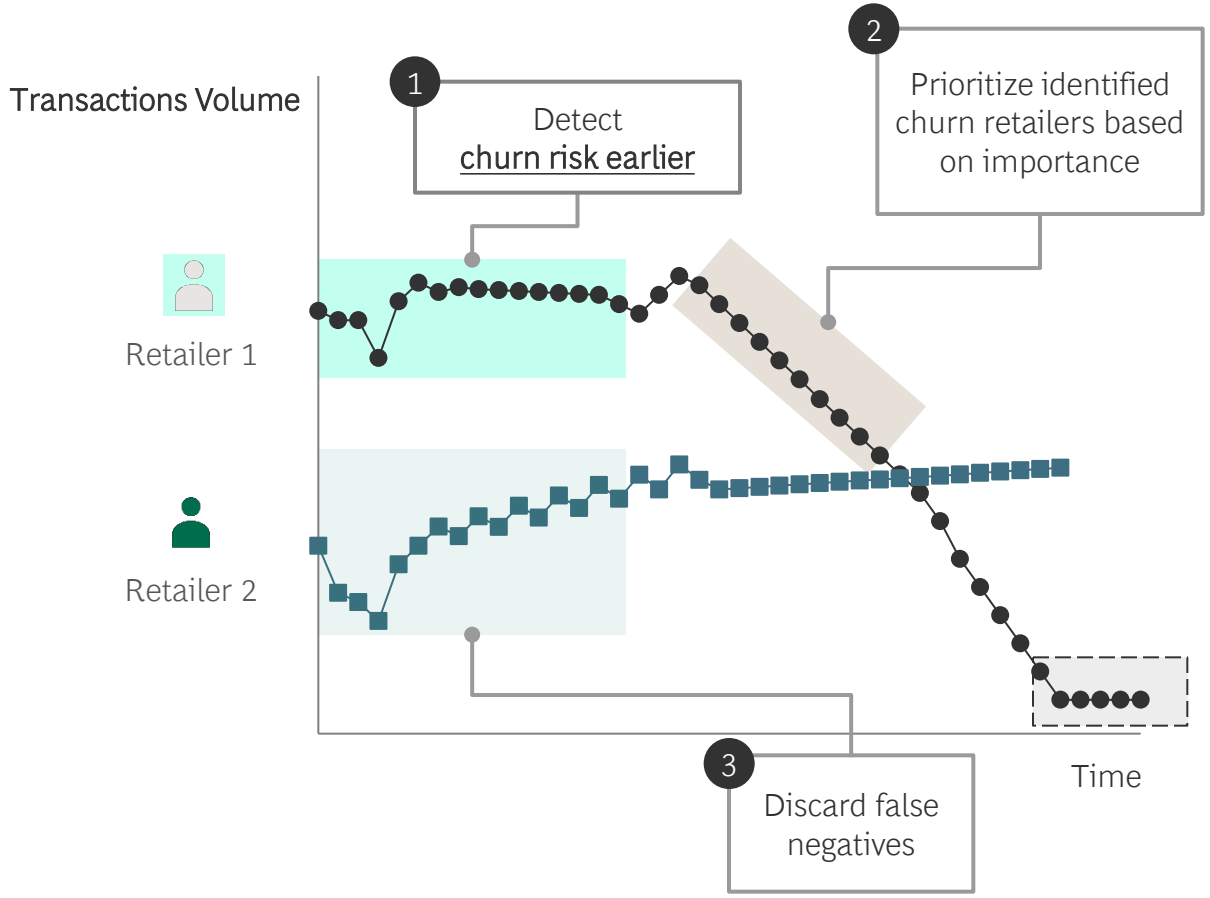
Identifying soft churn by predicting decline in relationship in advance



Defining Soft Churn:
If a retailer is not purchasing 3x from average purchase interval, then the retailer is exhibiting soft churn attributes.

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Business Performance Dashboard

Power BI Dashboard

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Business Performance Dashboard

Executive Summary

- Prepare an executive summary highlighting the key financial metrics for the latest year such as Total dollar sales & Volume, YoY Growth (CAGR), AOV, Repeat purchase rate, CLTV, Top selling categories etc

Sales Performance Dashboard

- Perform a sales trend analysis for last 12 months of data and present the next 90-180 days of forecast for top 5 retailers
- Create relevant visualizations to deep dive into sales across retailers, distributors, product categories and locations etc
- Create relevant filters to drilldown to the data by Top 5/10 Retailers

Retailer Insights Dashboard

- Create relevant visuals to show the outcome of customer segmentation done during the analysis (ideally via a heat map)
- Create deep-dive views for Top 2 segments to better understand the retailers:
  - Buying trend over months
  - Activity log (from events data)
  - Indicators such AOV and CAGR
  - Have slicers for Top (5/10/15) product categories/sub-categories/SKUs, location etc)
- These could then be utilized by learners in building customized marketing strategies

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What good looks like

Summary View

Sample dashboard (Illustrative)

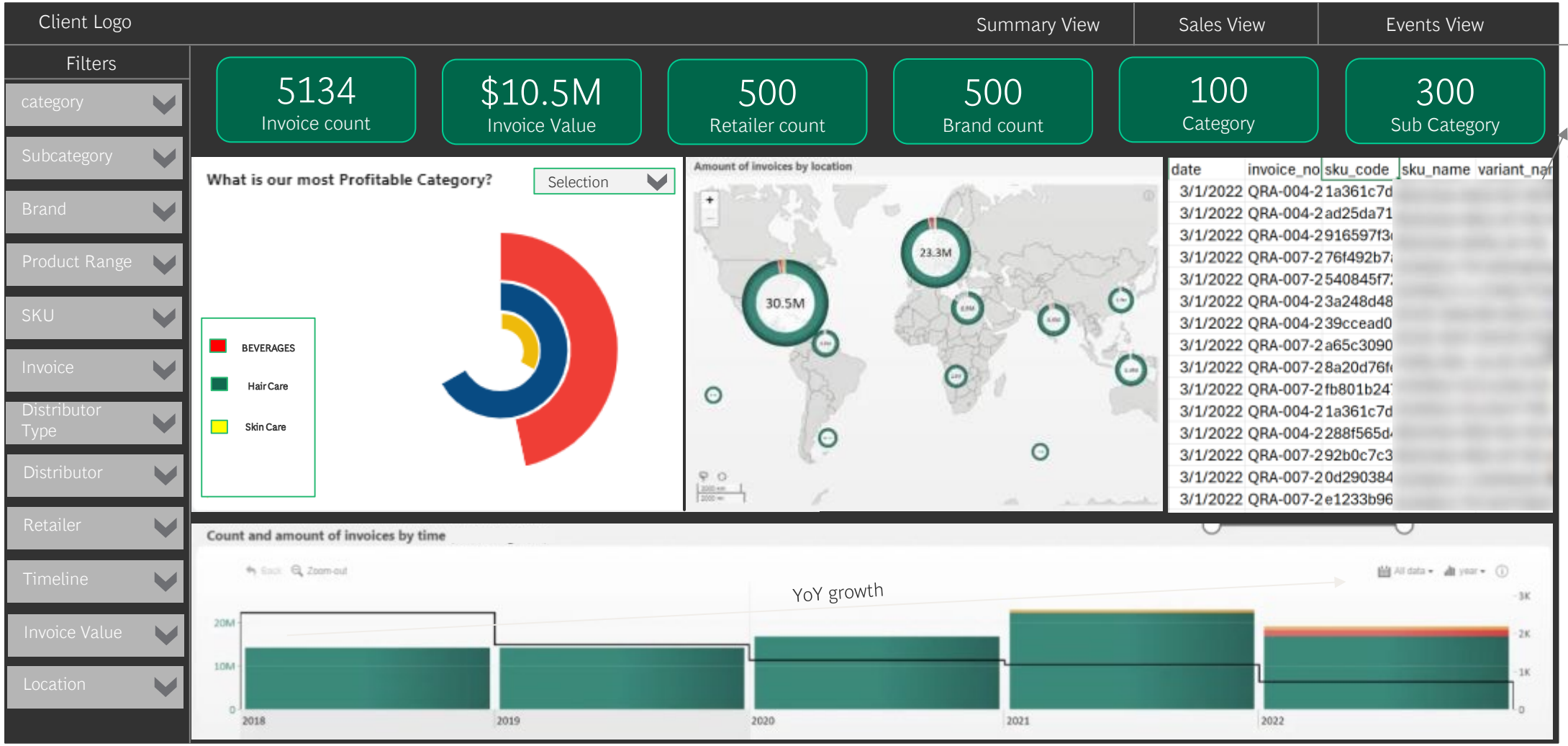

Table view, so that user have the option to look and download the background data

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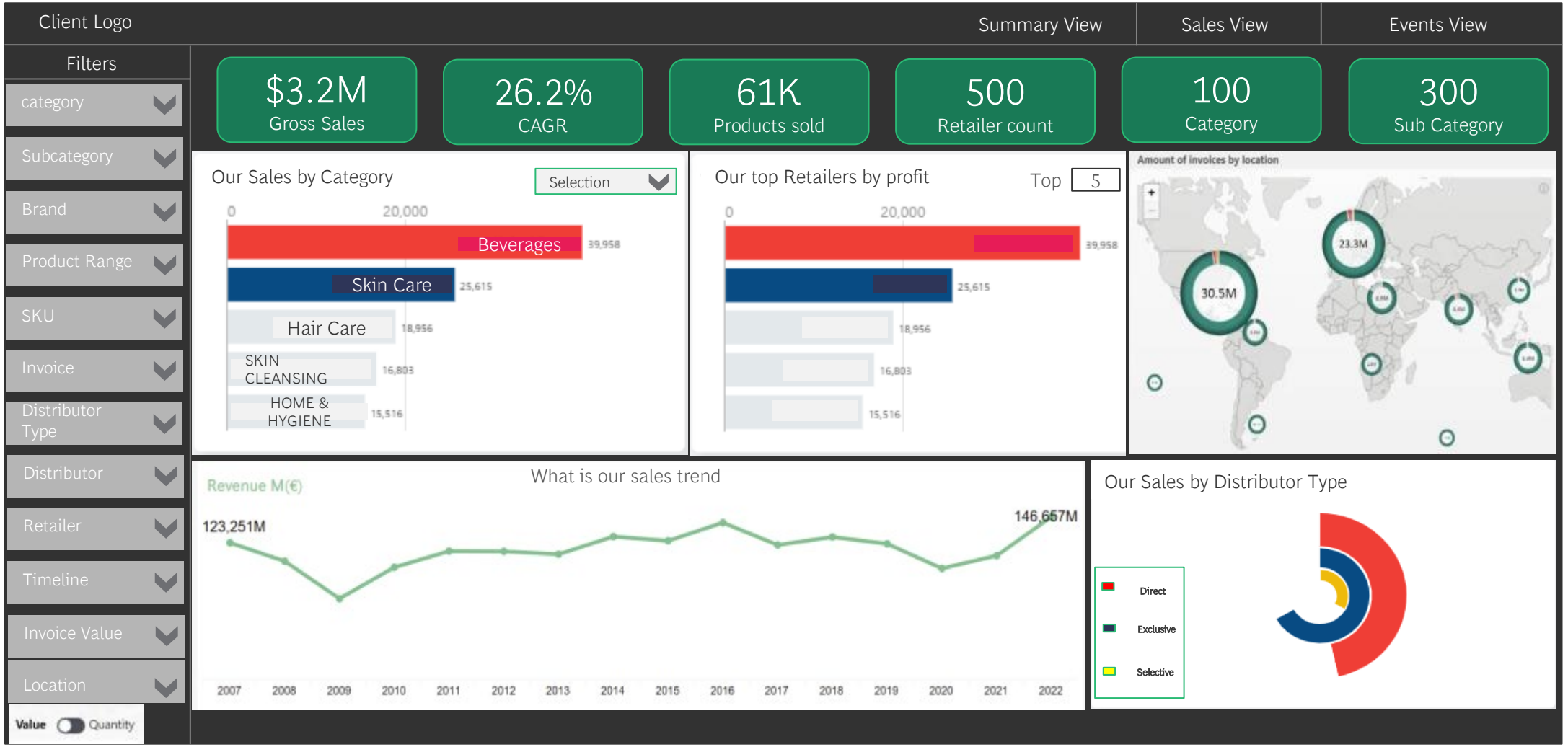
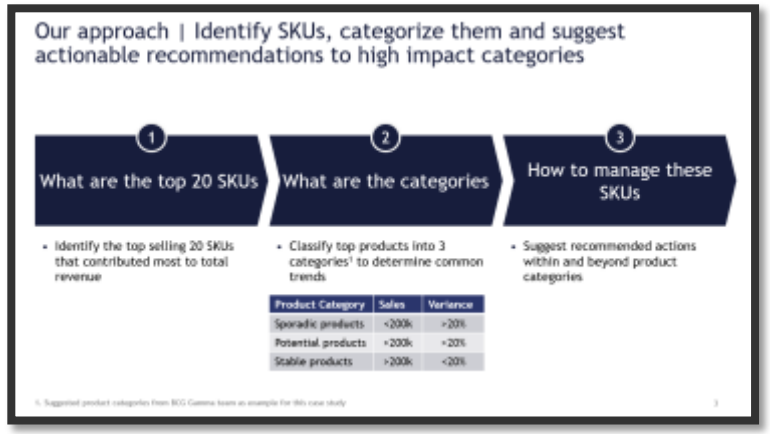
Sales View

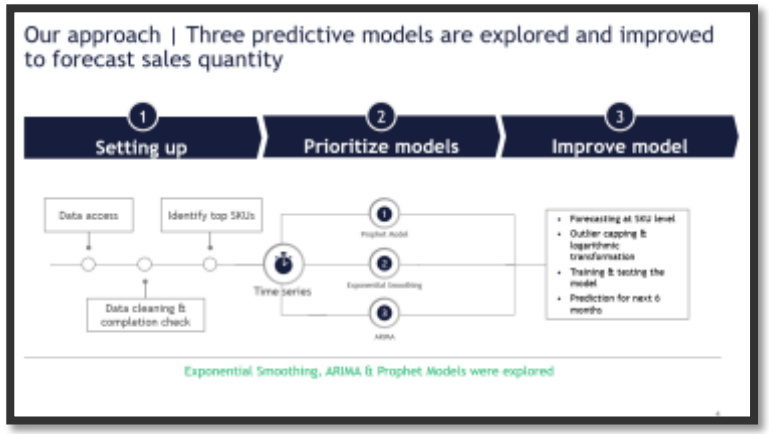
Sample dashboard (Illustrative)

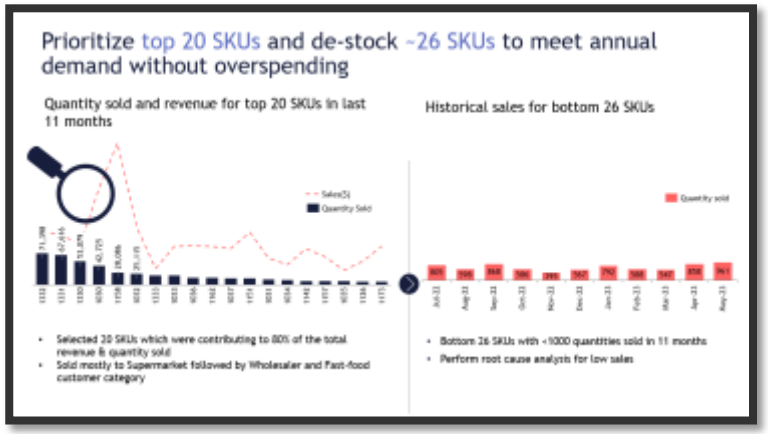


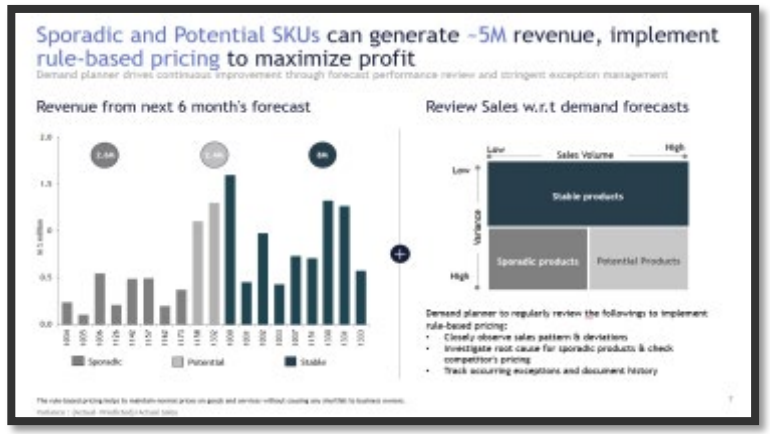
Make actionable insights and recommendations with quantifiable business impact

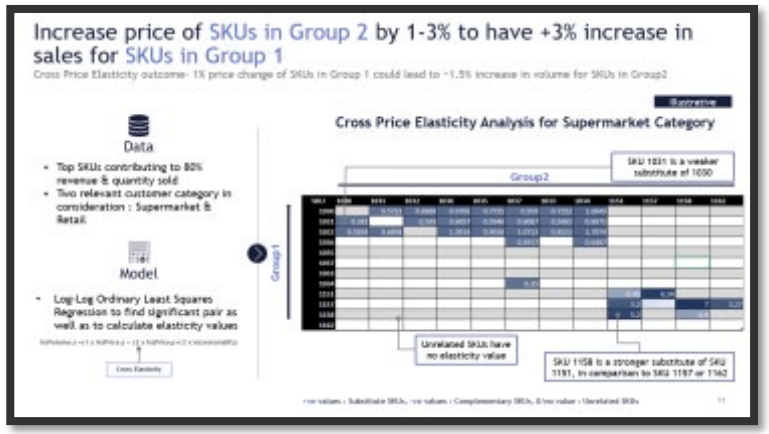
Samples (Illustrative)

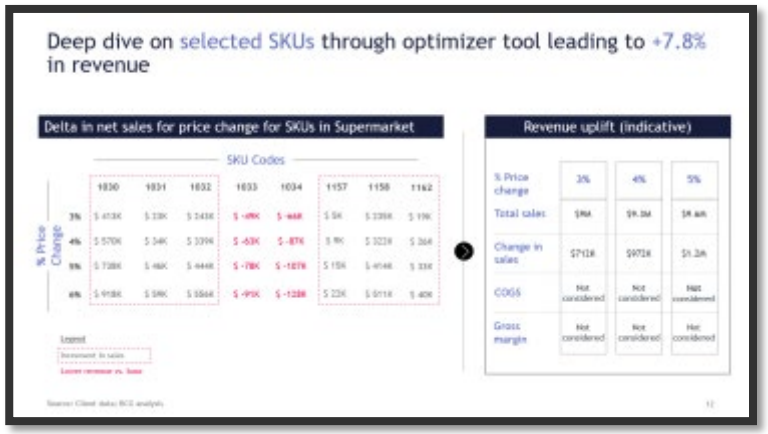












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Break
(15 minutes)

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Git and GitHub Briefing

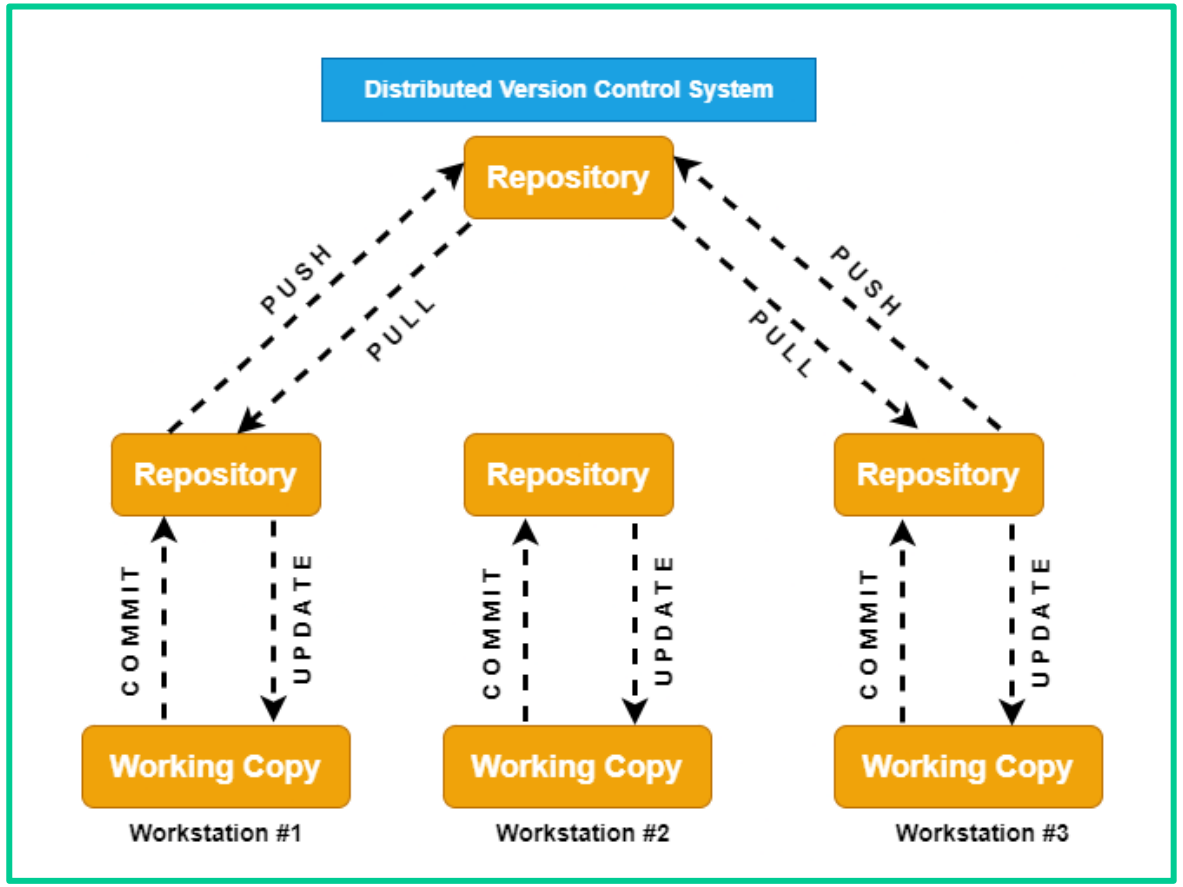
Version Control System: Git

Typical problems when coding in team-settings

- Whose computer stores the "official" copy of the project?
  - Can we store the project files in a neutral "official" location?
- Will we be able to read/write each other's changes?
  - Do we have the right file permissions?
- What happens if everyone try to edit the same file?
- What happens if we make a mistake and corrupt an important file?
  - Is there a way to keep backups of our project files?
- How do I know what code each teammate is working on?
  - Is there any project tracker in place?
- What if the critical file gets accidently deleted ?
- A bunch of changes made on working code which broke the code. Is there a way to get the working version back

Solution: Version Control System

Version control lets you track file changes and access specific versions when needed.



Collaboration:

Version control allows multiple developers to work on the same project without overwriting each other's work.

Track Changes:

Every change is recorded with details of who made it and why.

This helps in auditing, debugging, and understanding the project's evolution.

Experimentation:

Developers can create branches to test new features or ideas safely.

These branches can be merged or discarded without affecting the main codebase.

Rollback:

If something goes wrong, version control lets you revert to a previous stable version.

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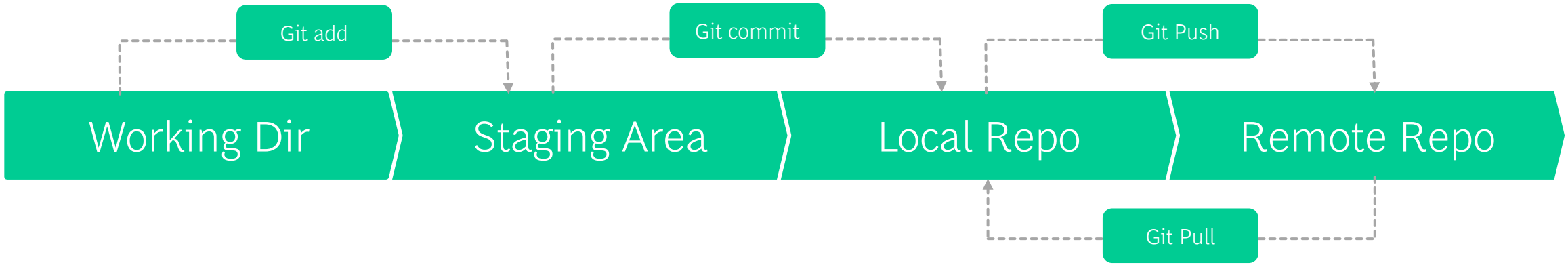
4 Stages of Git Workflow



This is the folder on your computer where you actively make changes to files.
It reflects your current project state, including untracked or modified files.

A holding area where you list changes you want to include in the next commit.
It lets you prepare and review changes before saving them to the repository.

The database on your machine that stores all your commits, branches, and history.
It tracks your project's full version history without needing an internet connection.

A version of your repository hosted on a server (e.g., GitHub, GitLab).
It allows collaboration by syncing changes between multiple developers' local repos.

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Definitions

Repository: A database storing file versions and history.

Commit: A snapshot of changes made to the files.

Branch: A divergent path of development, isolated from others.

Merge: The act of integrating changes from one branch into another.

Pull: Fetching and merging changes from a remote repository.

Push: Sending local changes to a remote repository.

Conflict: A state where simultaneous changes clash, requiring manual resolution.

Working of Version Control

Team members make changes to their local files.

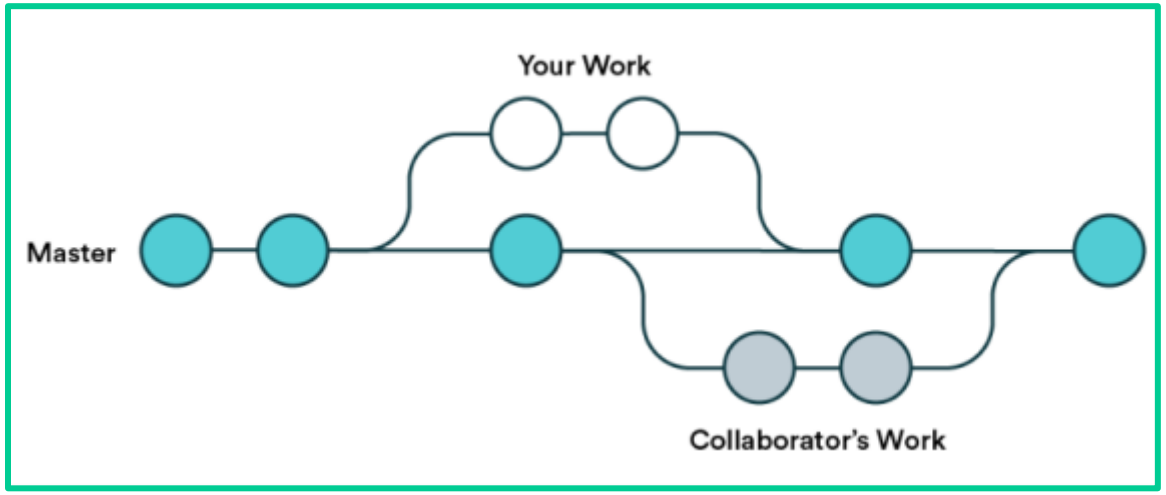
Changes are committed, creating a new version in the repository.

Branches allow developers to work on features in isolation.

Merging integrates changes from different branches.

Conflicts occur when changes clash, requiring manual resolution.

Branching in Git



The Master branch or main contains the workable codes.

Any testing is done on diverge branches that each collaborators create for each modules / tasks that they work on.

You can create a branch under the main branch. You can also create a sub branch under any other diverge branches.

After the codes are finalized in a branch, that branch can be merged with the main branch.

Collaboration in team setting

One-Time Setup

- Nominate a code master
- Identify key modules to be coded / milestones with owners so there is clear division of work and minimal overlaps
- Code master creates new repo for whole group – to consolidate all the code from everyone

Ongoing Working Model

- Everyone creates their own branch of master repo and starts to work on specific modules/ sections
- Setup regular schedule to push your individual changes to master (e.g. daily EoD or twice in a week)
- Code master to review and send-back or merge changes
- Everyone does a refresh / re-pull of master when starting with new changes / in morning everyday

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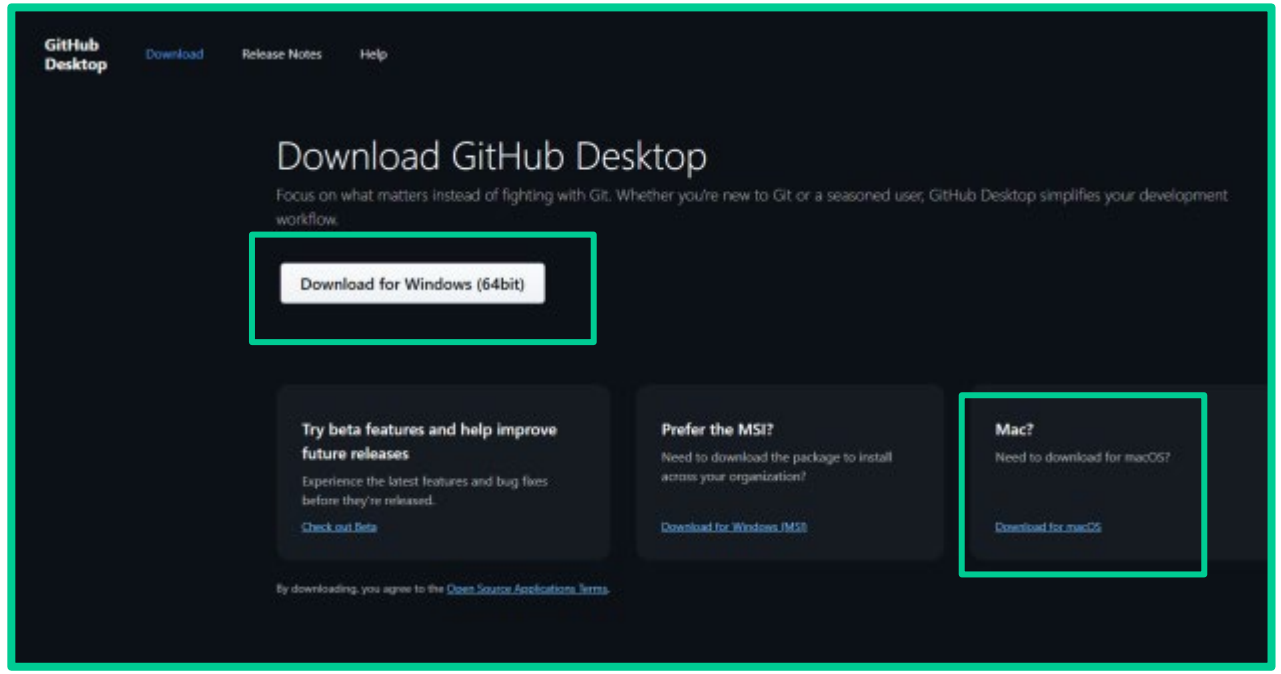
Setting up of GitHub Desktop

Installation of GitHub Desktop



1. Download GitHub Desktop from here: GitHub Desktop Download

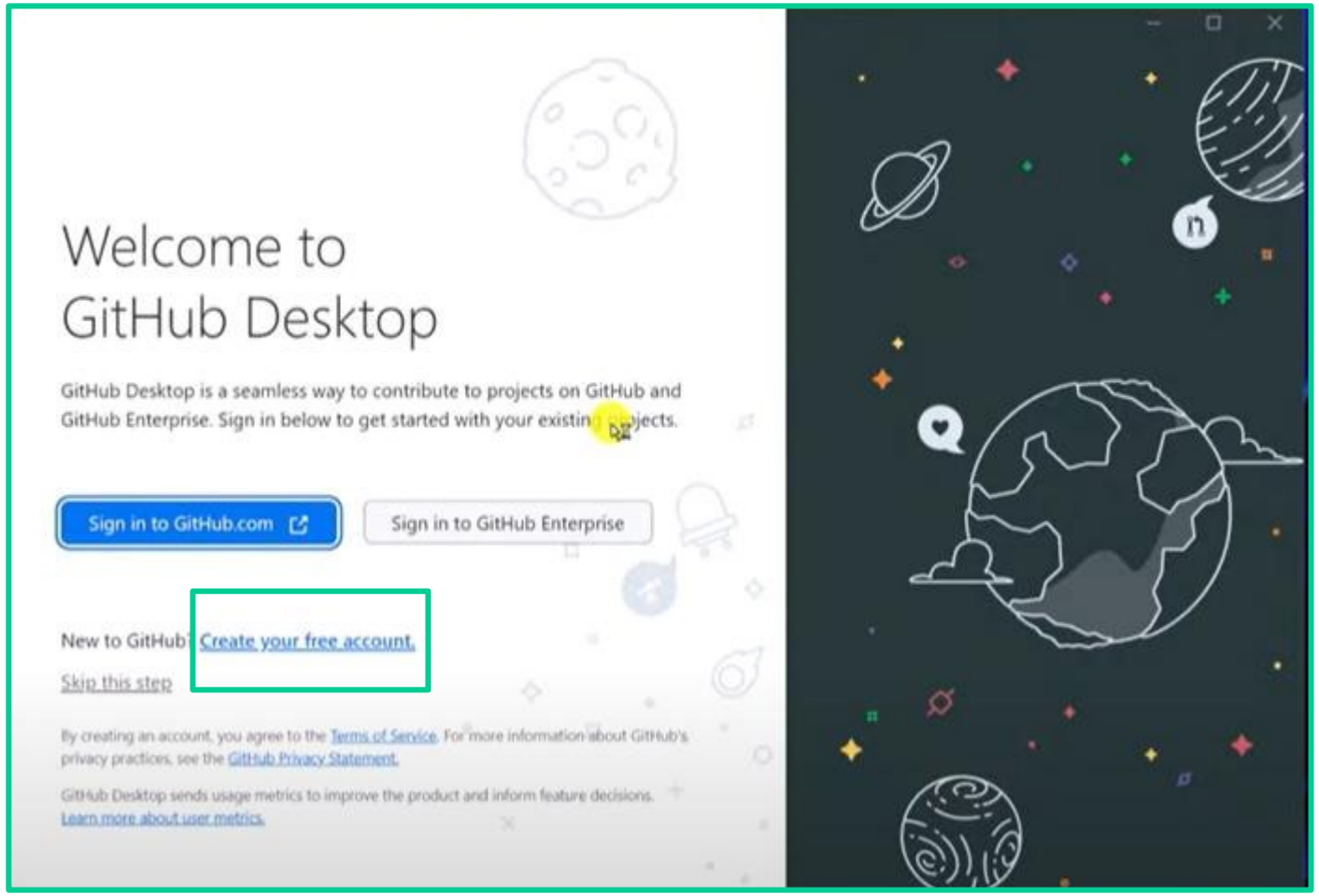
2. Click Download for Windows machine.

Alternative download links:
- Windows
- Mac

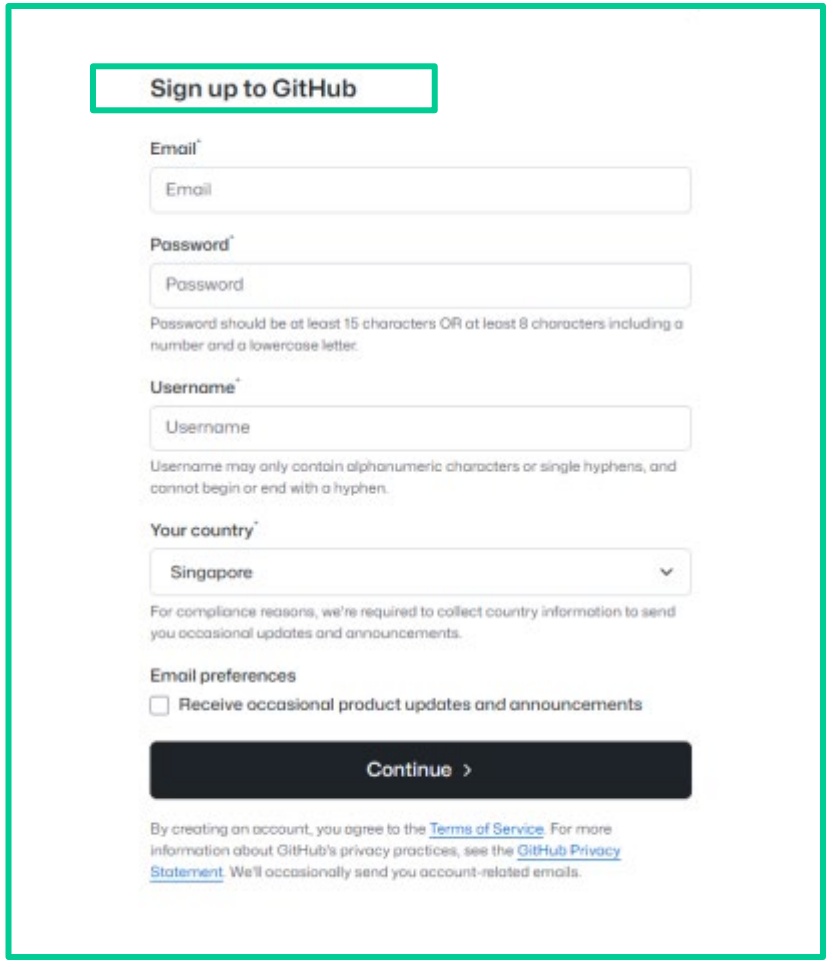
3. In your computer's Downloads folder, double-click the GitHub Desktop setup file.

4. GitHub Desktop will launch after installation is complete.

Sign up to GitHub



Click on Create your free account to create an account in GitHub if you don't have one.



Key in the details and hit Continue.

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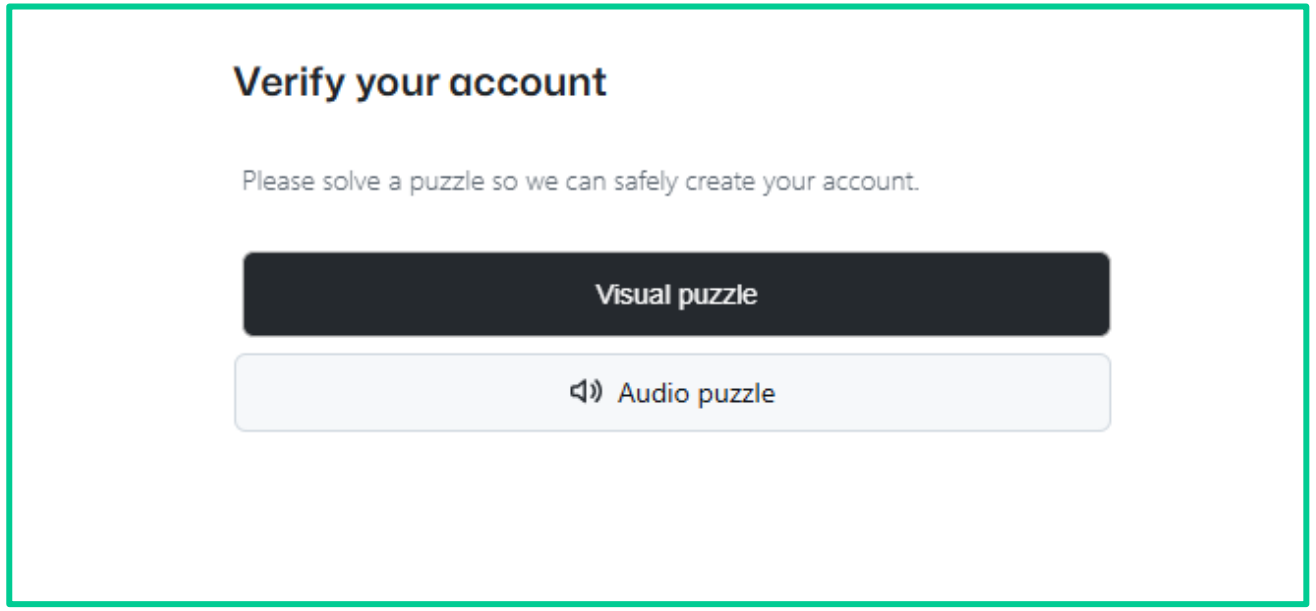
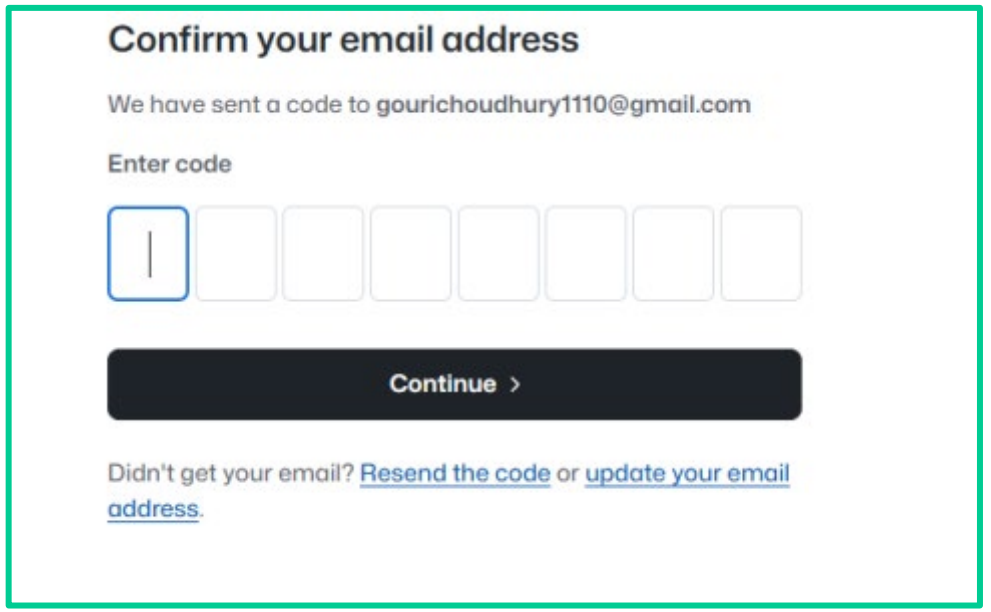
Verify your account



Verify your account by using Visual puzzle or Audio puzzle.



You will receive a code in your registered email address. Key in the code here and click on Continue.

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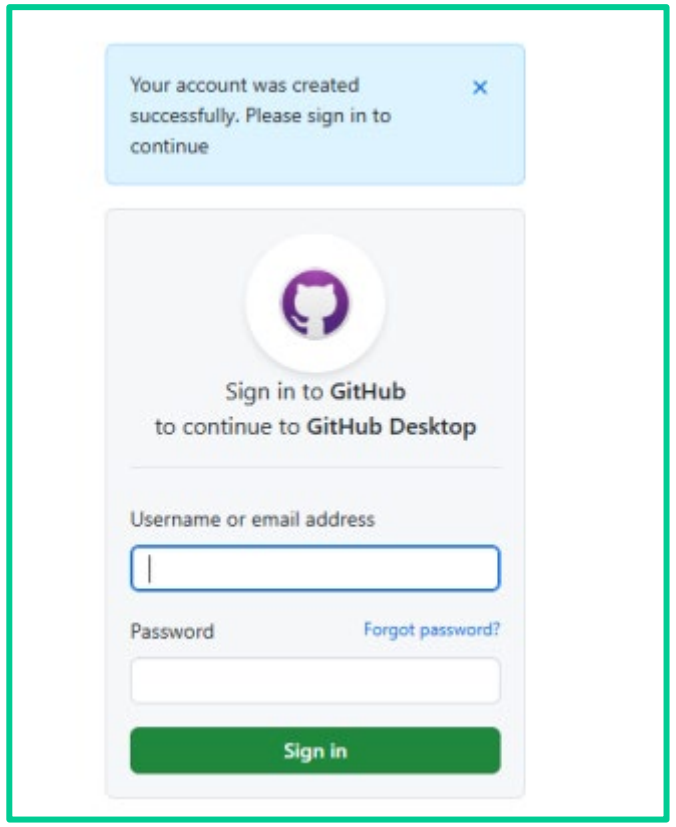
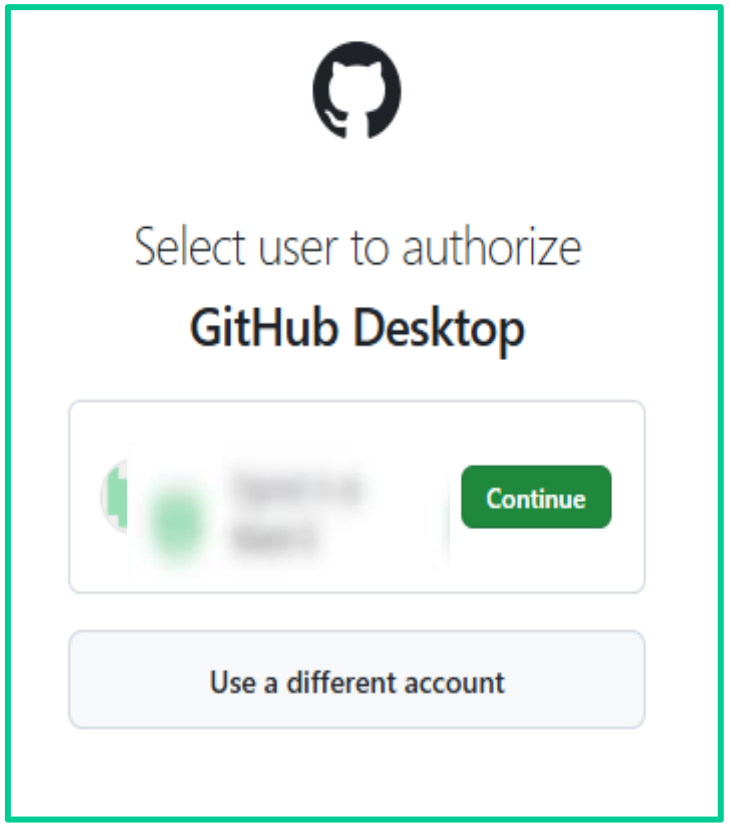
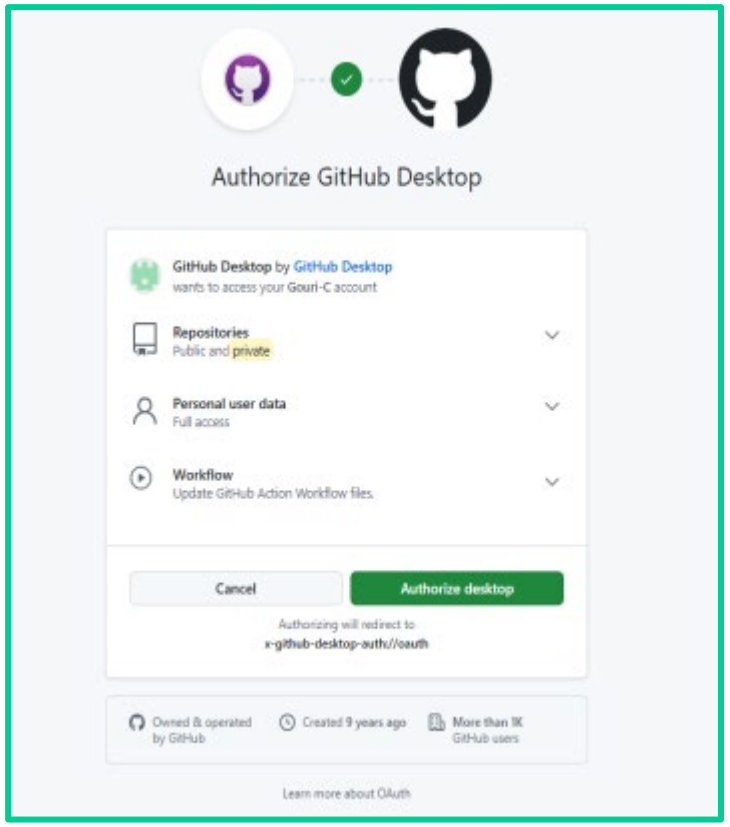
Connect GitHub with GitHub desktop



Sign in to GitHub using the correct credentials.



Click on Continue.



Click on Authorize desktop and from the pop up, click on Ok.

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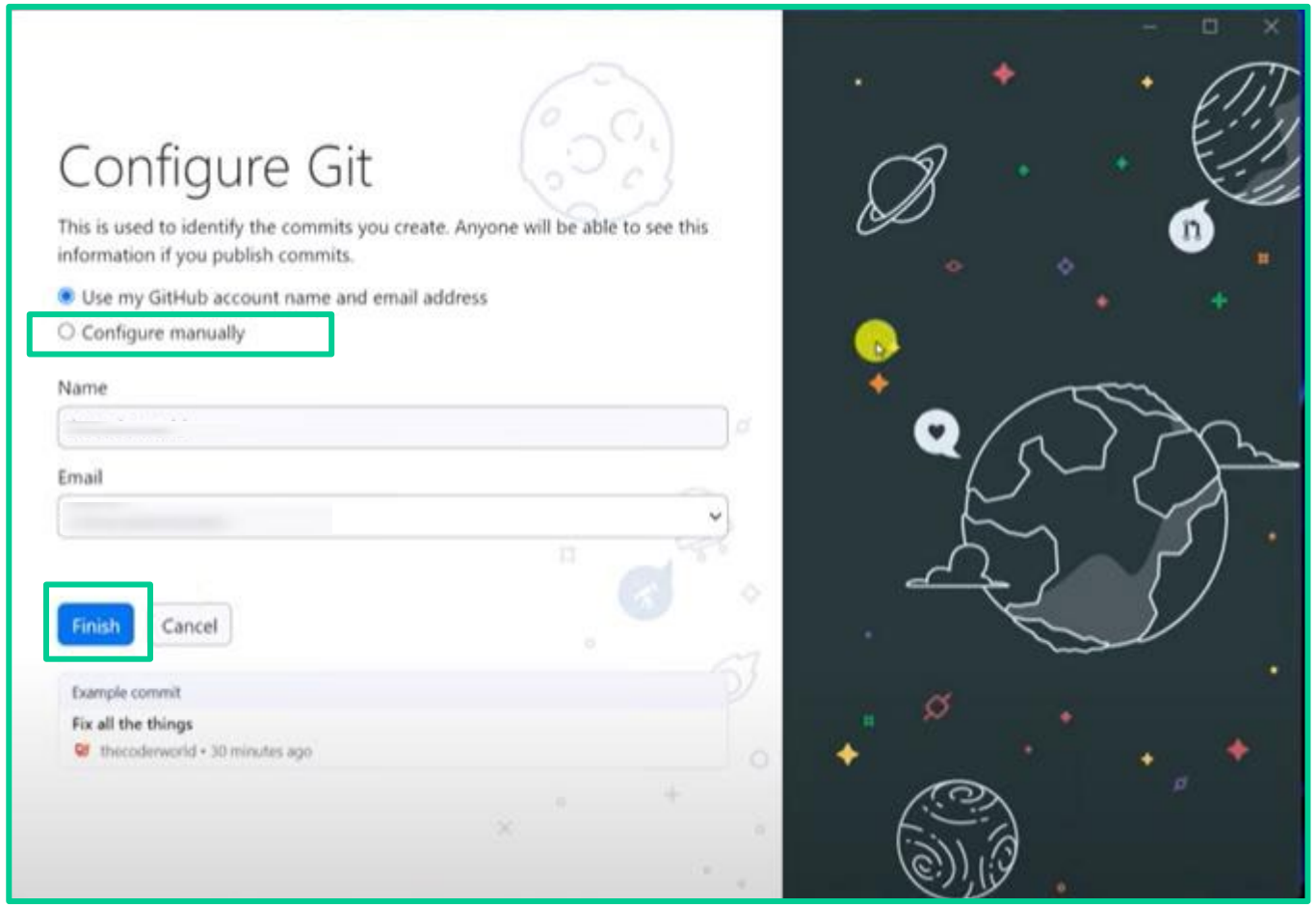
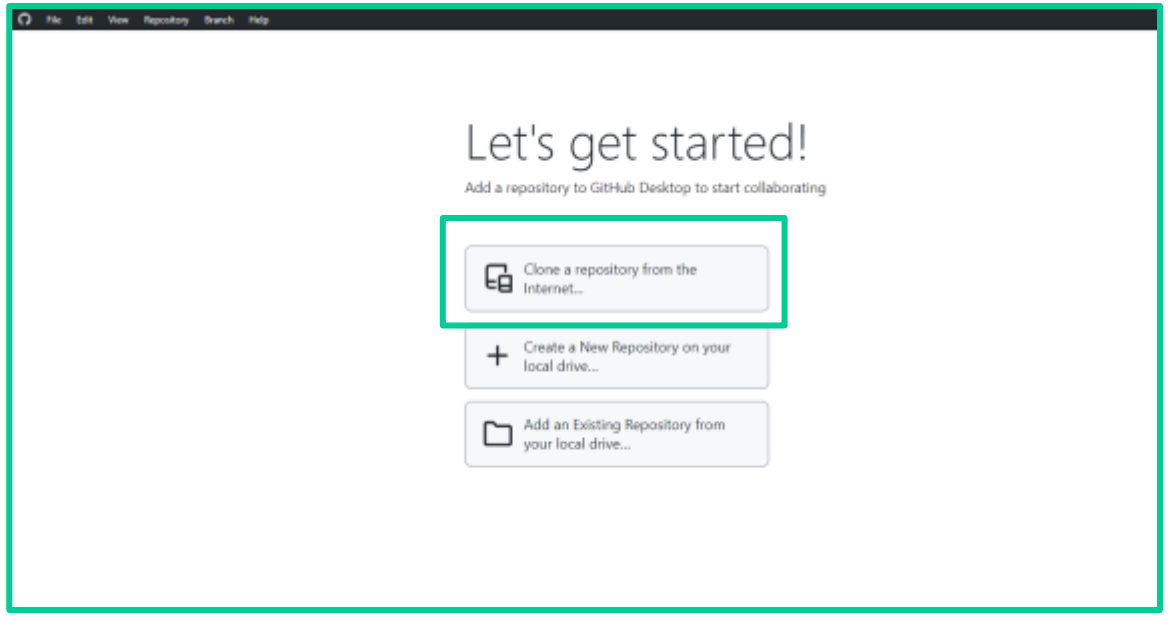
Configure Git

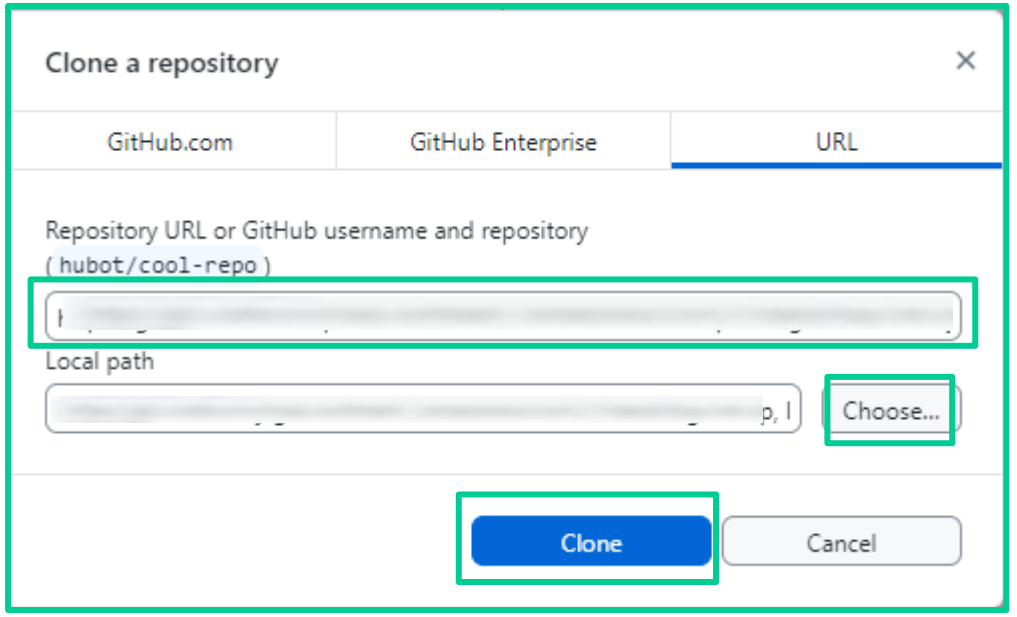


- Click on Configure manually.
- Key in the Name and Email (that is used to register in the program).
- Click on Finish.

Cloning a Repository



Click on Clone a repository from the Internet.



Key in the Repository URL *(This is shared by TA).*
Choose the path in your local system where you would like to clone the repository (*You may choose Desktop for easy access*).
Hit the Clone button.
A pop-up window will open to authenticate. Key in the credentials (*This is shared by TA*).

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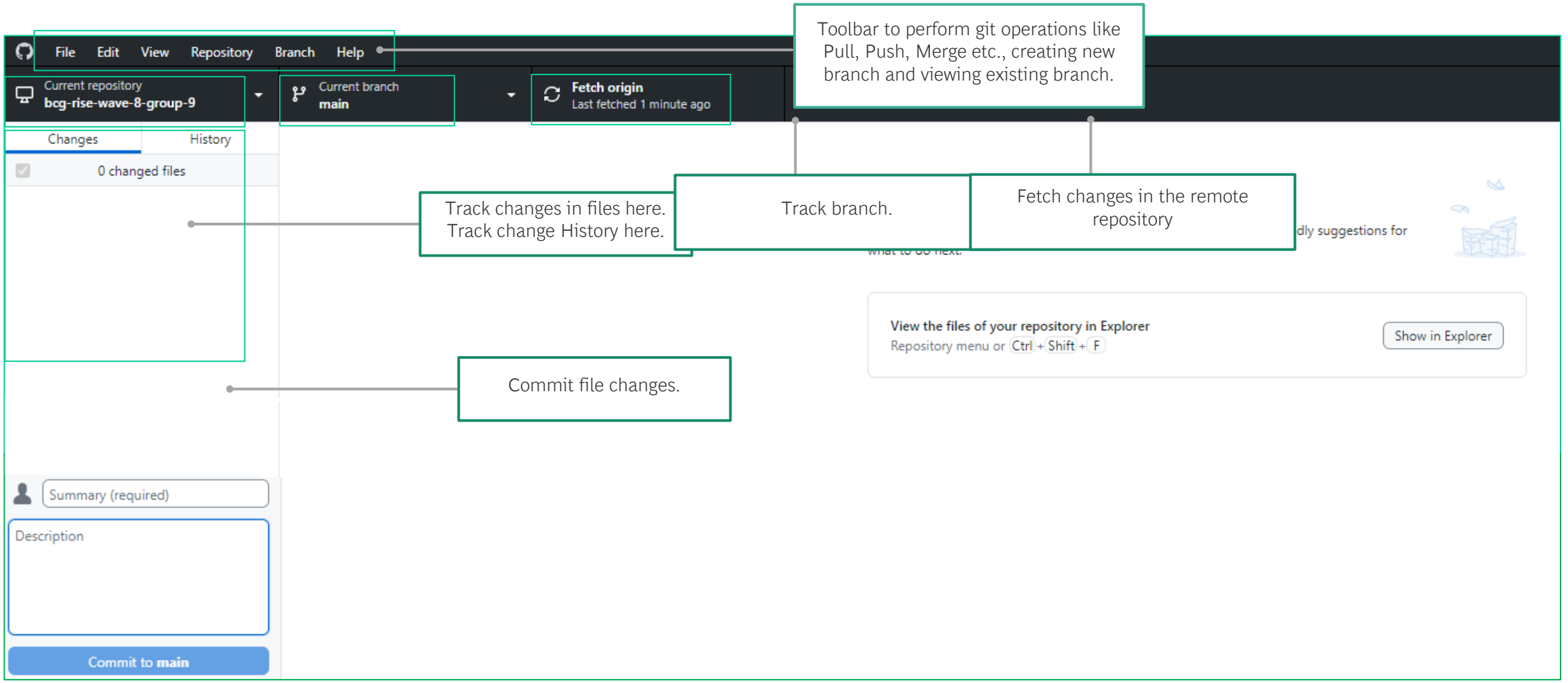
AWS repository is set up in GitHub Desktop



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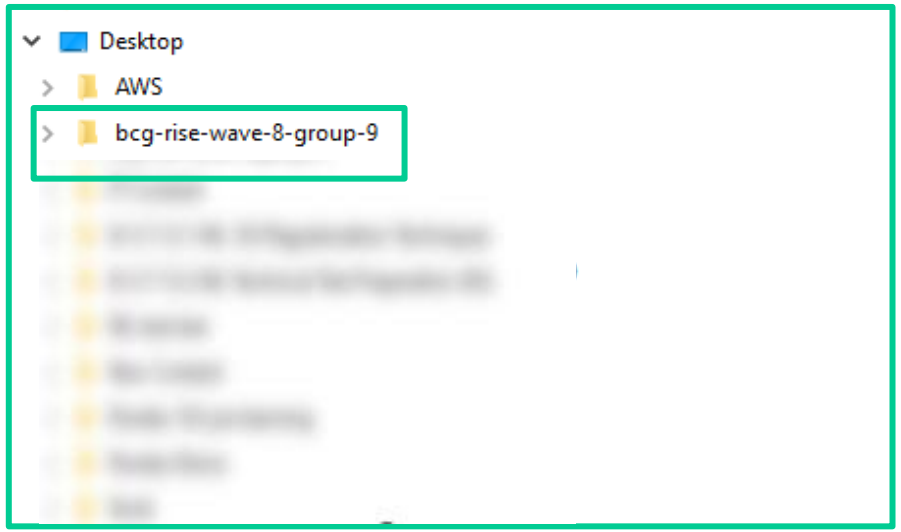
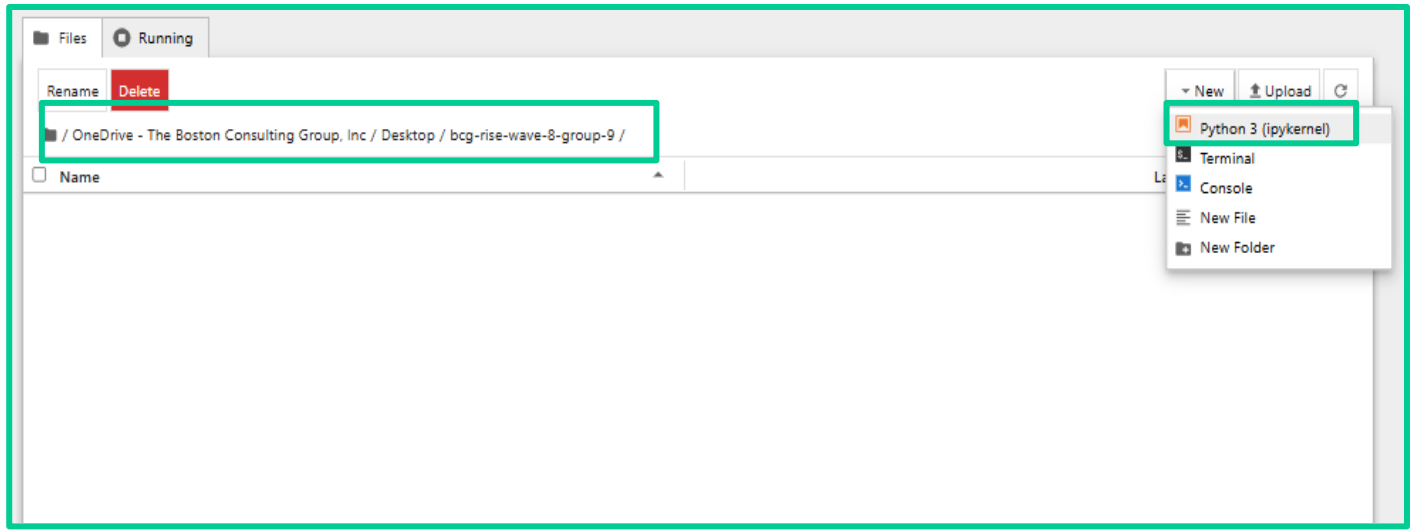
The cloned repository is also residing in your local machine.





The repository will contain a .git folder. This is to track all changes.

You can create new Jupyter notebook from your local repository that can be tracked by the version control system git. As soon as you create a new notebook, this will be reflected in the GitHub desktop Change section.

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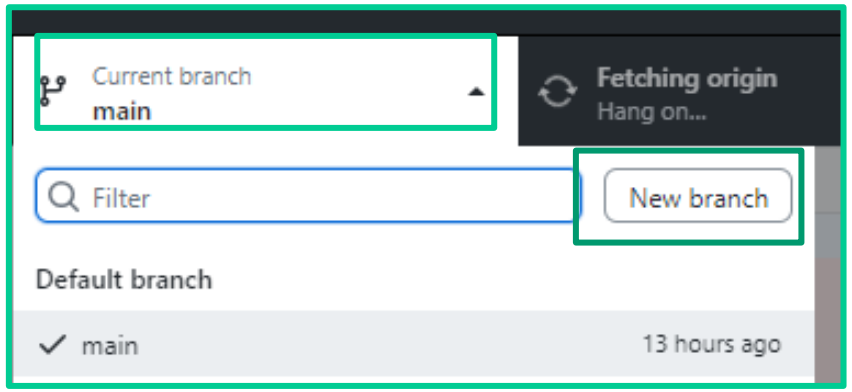
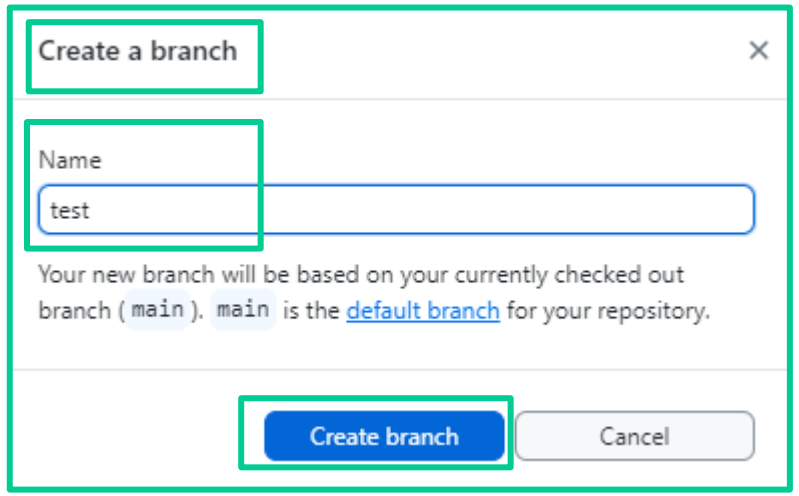
Working with GitHub Desktop

Create a branch in the repository



In GitHub desktop, navigate to the Current branch option. Click on the dropdown beside.

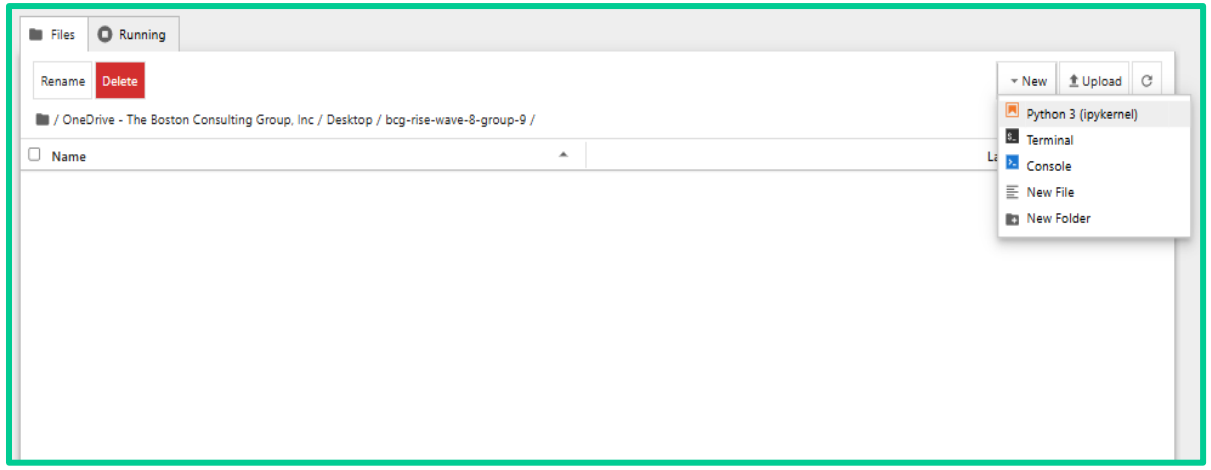
Click on New Branch.

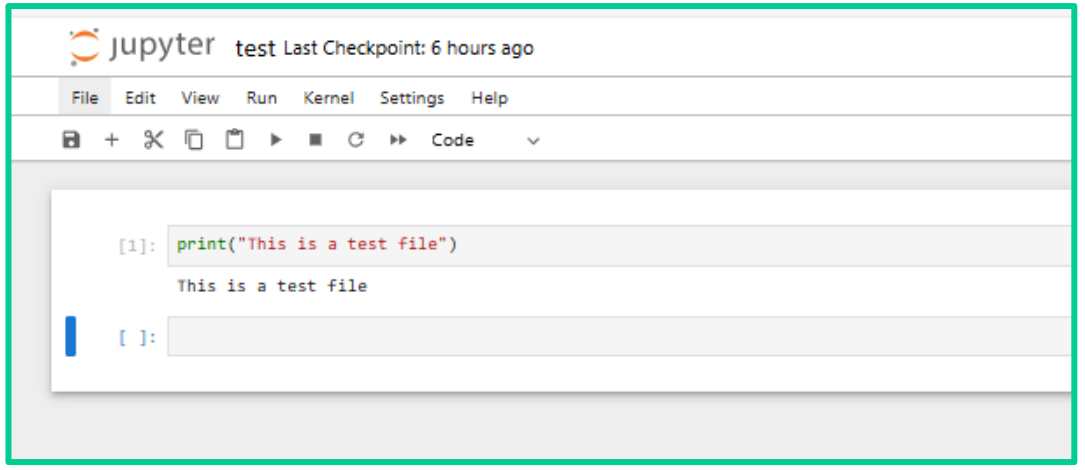


Give a name to the branch in the Name section.

To differentiate your branch from others, provide a name like test-*yourname*.

Launch Jupyter Notebook from Git Working Dir





Launch Jupyter Notebook from the location where you have cloned the AWS repository. Name the notebook *testJN-yourname.ipynb.* Write a simple script in the notebook like in the screenshot.

You just created a notebook in your local working directory. The team members will yet not have access to this notebook.

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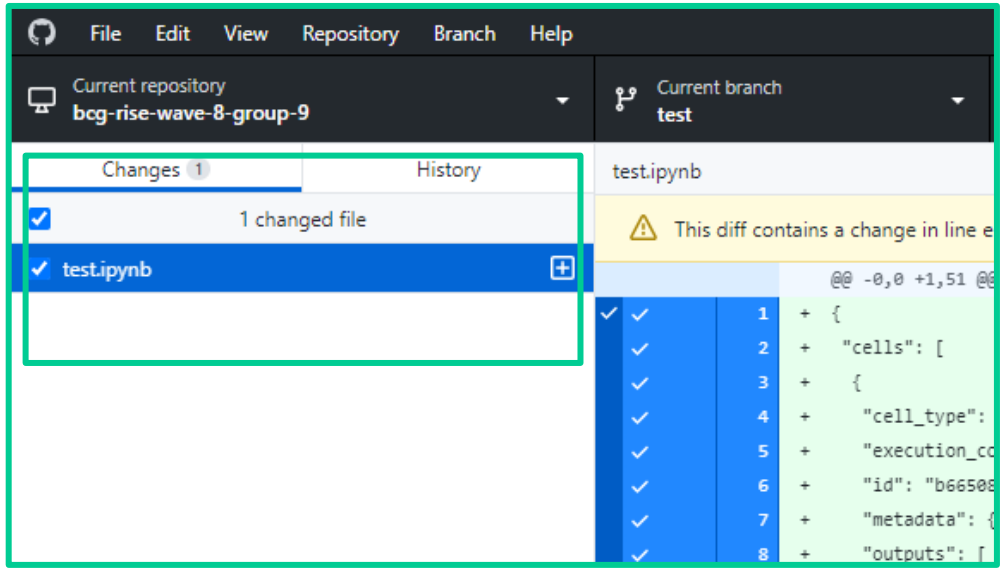
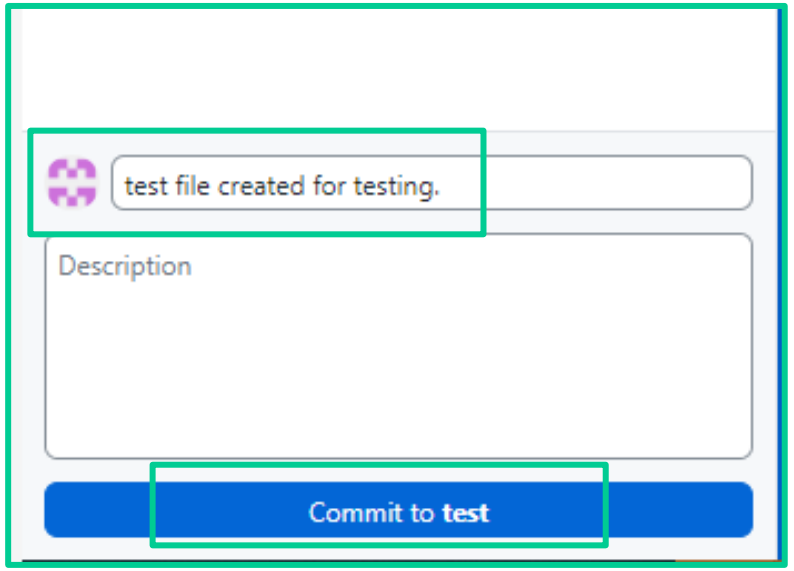
Commit changes to Local Repository

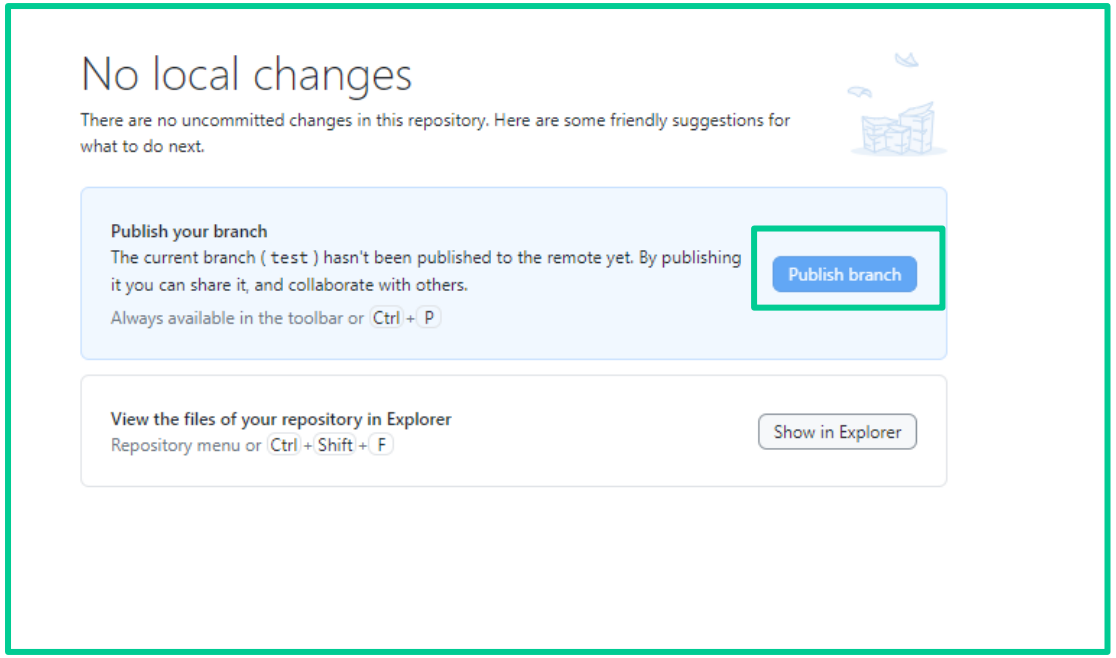


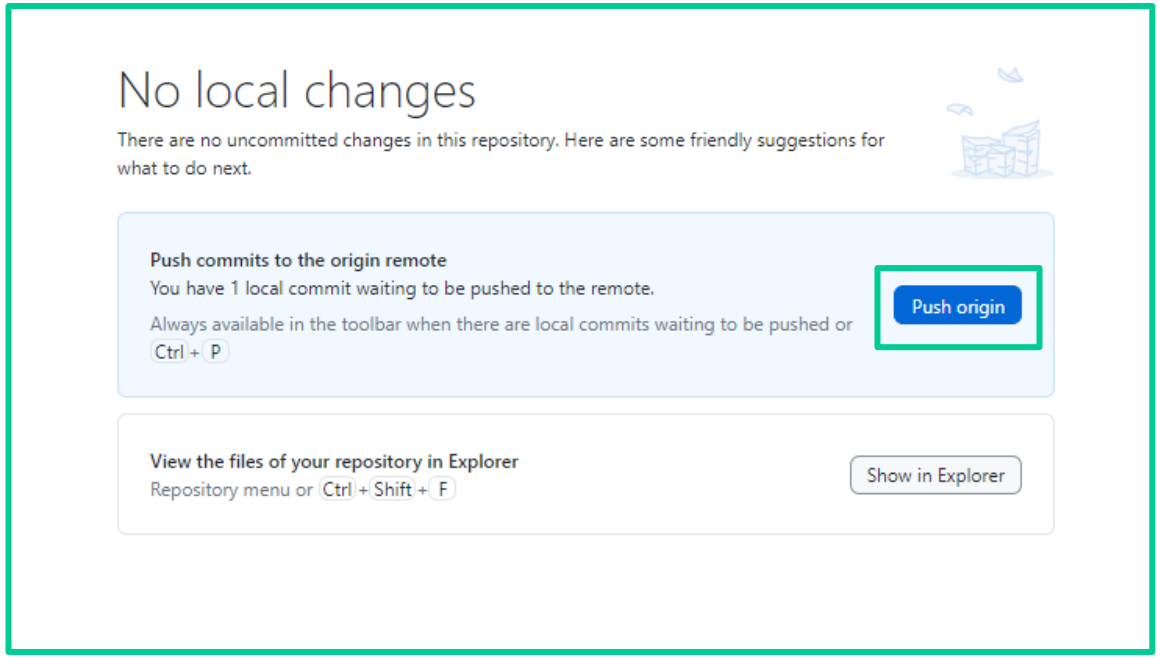
Open GitHub Desktop. You will notice the list of files that you created in the Changes section.



To reflect these changes to the local repository, we must commit the changes. Go to the bottom left corner. Provide a meaningful message in the box as highlighted above. Click on Commit to *yourbranchname*. Your file is now in the local repository. Your team members will not have access to the file yet.

Push changes to the Remote Repository





If the branch you created is not published, you will find an option to publish the branch on GitHub desktop. Click on Publish branch. This will also push the file to the remote repository.

If the branch is already published, you will find an option to Push origin in GitHub desktop. This will push the file to the remote repository.

Once the files are pushed to the remote repository, your team members will be able to view the files.

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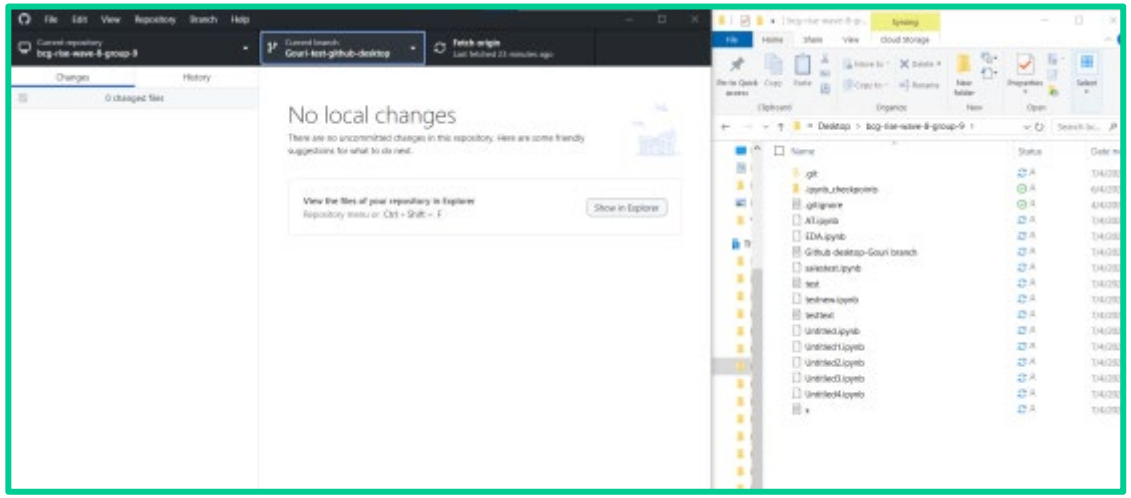
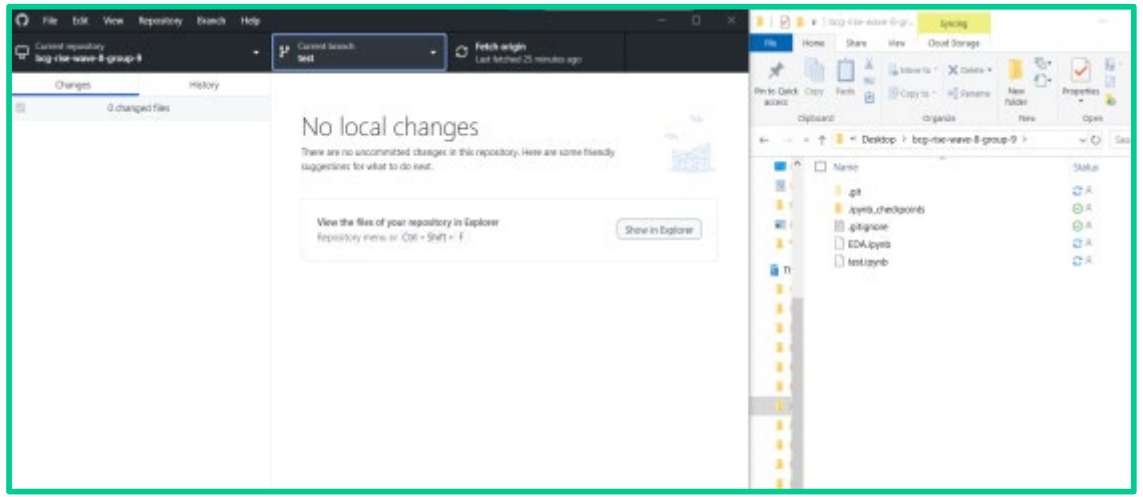
Viewing others' files





After the changes are pushed to the remote repositories. All team members can switch branches and go to the team member's branch from the dropdown beside Current branch. As soon as you switch branch, you can view the respective files in file explorer.

Notes:

1. When switching branch, you will come across branches of the following form:
   - Origin/Test : This is the branch in remote repository
   - Test: This is the copy of the branch in local repository
2. Ensure to switch back to your branch after reviewing / changing your team member's codes.

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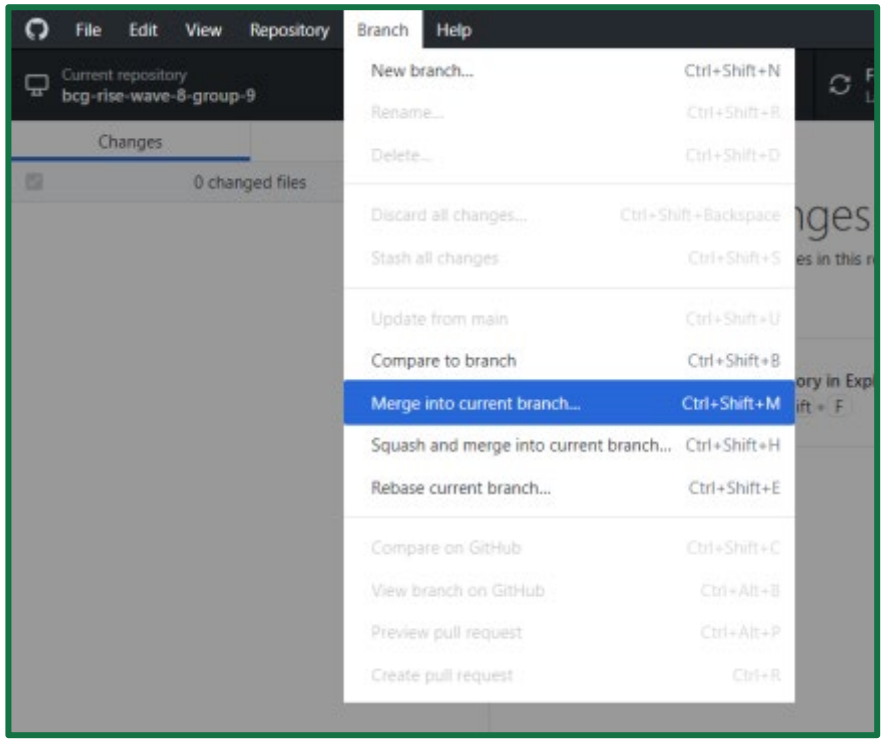
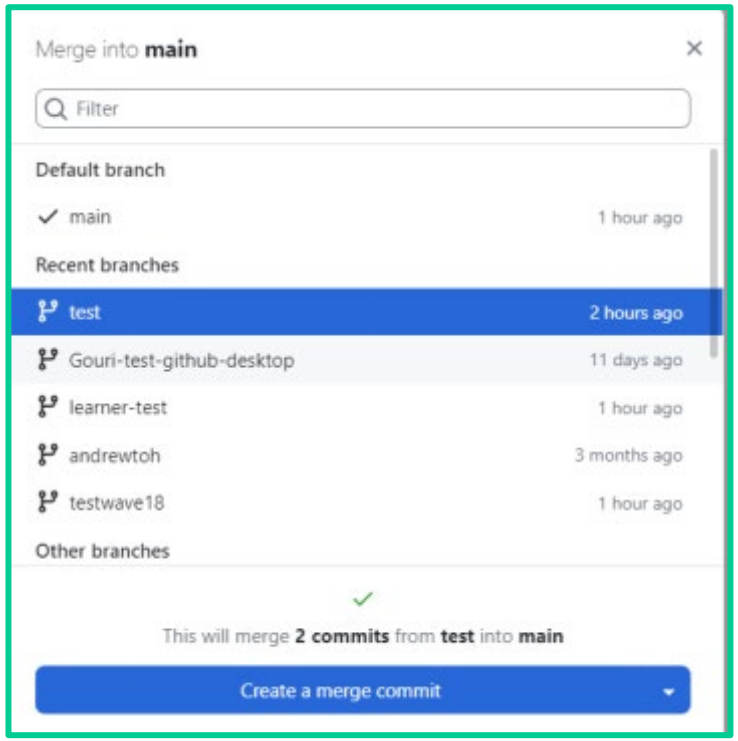
Merge branch to the main branch

Merge branch only when you have the final notebooks for the project. The branch that contains the final notebook should be merged to the main branch. The main branch will serve as the final codebase of the project.



Select main branch from the drop down beside Current branch, then select Branch from the toolbar. Click on Merge into current branch.



Click on the branch name that you want to merge with and select Create new merge commit. Push the changes to remote repo by clicking on Push origin.

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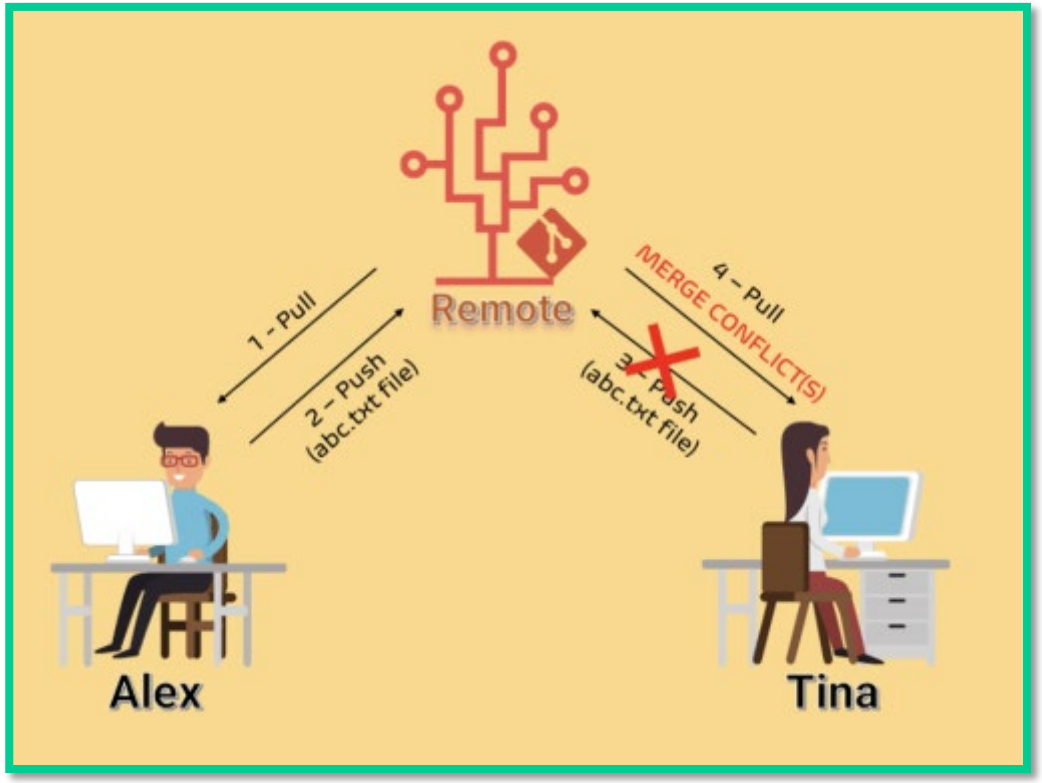
Merging Conflict

Merge conflict is an event that takes place when Git is unable to automatically resolve differences in code between two commits.



- Let's consider two developers A and B
- After making the changes, Developer A pushes the file back to the remote repository from his local repository.
- Now, when Developer B tries to push that file after making the changes from his end, he is unable to do so, as the file has already been changed in the remote repository.
- To prevent such conflicts, developers work in separate isolated branches.
- The Git merge command combines separate branches and resolves any conflicting edits.

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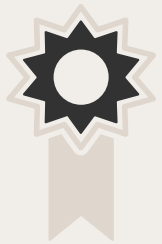

Best Practice coding guidelines

1. Make incremental, small changes
2. Don’t git push straight to master. Branch it out!
3. Commit early, commit often
4. Write descriptive and meaningful commit messages
5. Add description to code using comments. Use headings and documentation in Markdown cells.
6. Refactor & break long code blocks into smaller code modules.

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Business & Data Analytics

Capstone Presentation & Graduation

We are thrilled to invite you to our upcoming in-person BCG Business & Data Analytics Capstone! On this day, you will have the opportunity to showcase your project to a hand-pick panel of experts from BCG, as well as our capstone partner, Qinet.

This event will serve as the perfect platform for you to showcase all the skills you have learnt from the programme, and network with your fellow trainers and learners. The expert panel will also provide you with valuable feedback that will help you take your career to the next level.

So, please mark your calendar and get ready to impress! We can't wait to see what you've accomplished and to celebrate your success.

Date:
Refer to your schedule/LMS (Presentation Day)

9am-2pm
(SGT)
Lunch will be provided

BCG Office
79 Robinson Road
Level 27 CapitaSky

Dress Code
Smart Casual

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Thank you

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Capstone Practitioner Sharing