Welcome to this CoGrammar Lecture: Git Workflow and Collaboration

The session will start shortly...

Questions? Drop them in the chat.
We'll have dedicated moderators
answering questions.

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Software Engineering Session Housekeeping

- The use of disrespectful language is prohibited in the questions, this is a supportive, learning environment for all - please engage accordingly. **(Fundamental British Values: Mutual Respect and Tolerance)**
- No question is daft or silly - **ask them!**
- There are **Q&A sessions** throughout this session, should you wish to ask any follow-up questions.
- If you have any questions outside of this lecture, or that are not answered during this lecture, please do submit these for upcoming Academic Sessions. You can submit these questions here: **Questions**

Software Engineering Session Housekeeping cont.

- For all **non-academic questions**, please submit a query: www.hyperiondev.com/support
- Report a **safeguarding** incident: www.hyperiondev.com/safeguardreporting
- We would love your **feedback** on lectures: Feedback on Lectures

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Why Enable Browser Captions?

- Captions provide **real-time text for spoken content**, ensuring inclusivity.
- Ideal for individuals in noisy or quiet environments or for those with **hearing impairments**.

How to Activate Captions:

1. **YouTube or Video Players:**
   - Look for the CC (Closed Captions) icon and click to enable.
2. **Browser Settings:**
   - Google Chrome: Go to *Settings > Accessibility > Live Captions* and toggle ON.
   - Edge: Enable captions in *Settings > Accessibility*.

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If you are feeling upset or unsafe, are worried about a friend, student or family member, or you feel like something isn't right, speak to our safeguarding team:

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Simone Botes

Nurhaan Snyman

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Scan to report a safeguarding concern

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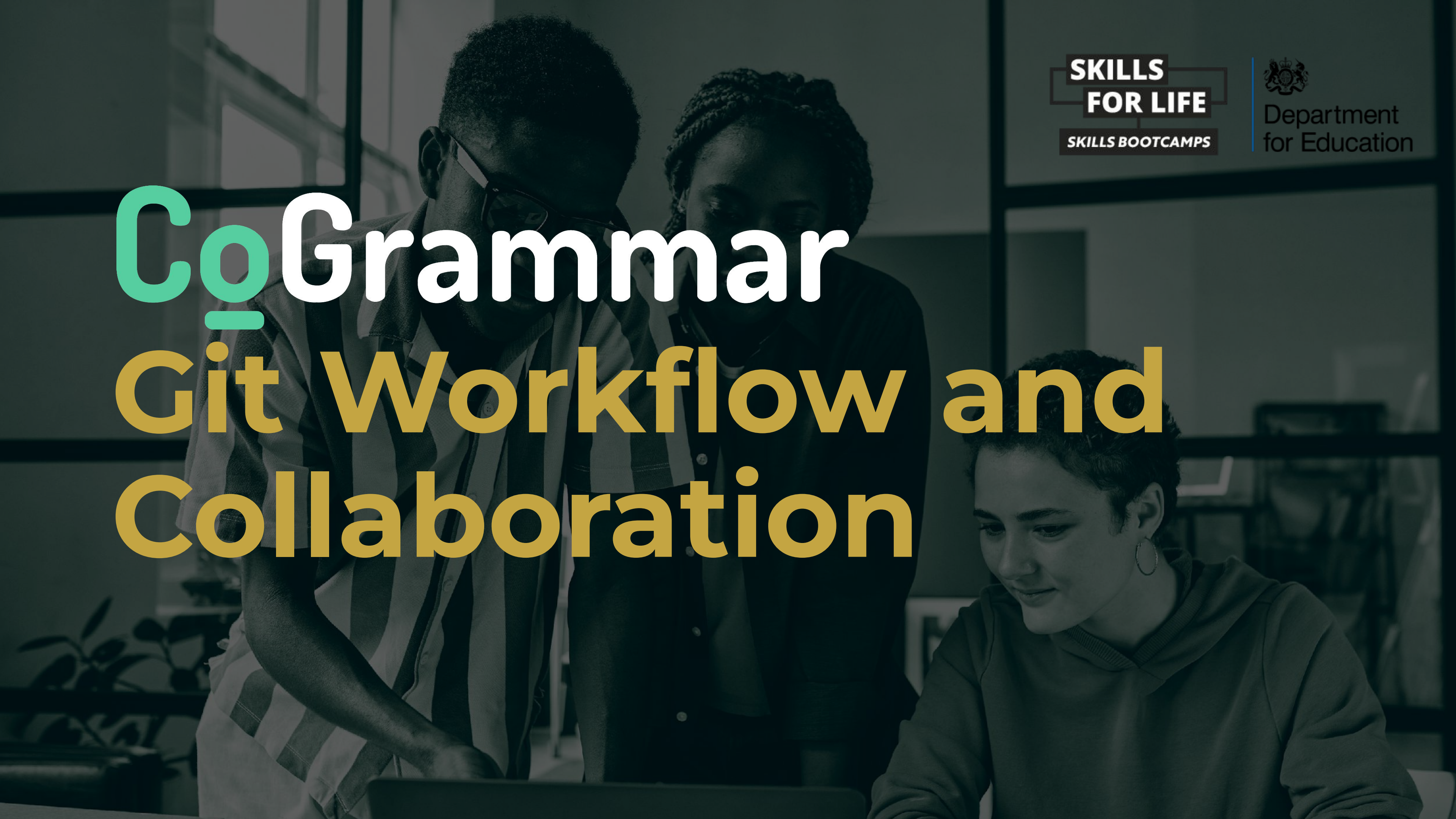

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Git Workflow and Collaboration

Learning Objectives & Outcomes

- Perform Git Collaboration and Best Practices
- Explain branching strategies (feature branches, master/main)
- Describe merging branches and resolving conflicts
- Explain and describe .gitignore
- Explain and perform to Pull Requests (PRs) and code reviews (via GitHub)
- Resolve merge conflicts effectively.
- Assess the impact of version control on collaboration.
- Collaborate on a shared project using remote repositories and platforms like GitHub.

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Git Workflow & Collaboration in Enterprise

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Git Workflow & Collaboration in Enterprise

Google Android Development

- 2000+ developers
- 40+ million lines of code
- 40,000+ commits monthly
- Git-based version control essential

Microsoft's Windows Development

- World's largest Git repo
- 4000+ developers
- 85+ million lines of code
- Git enables simultaneous development

Why This Matters:

- Modern software development requires coordinating thousands of developers
- Version control is crucial for managing complex codebases and preventing conflicts
- Git skills are essential for working in any modern development team
- Understanding Git workflow is a fundamental skill for career growth in tech

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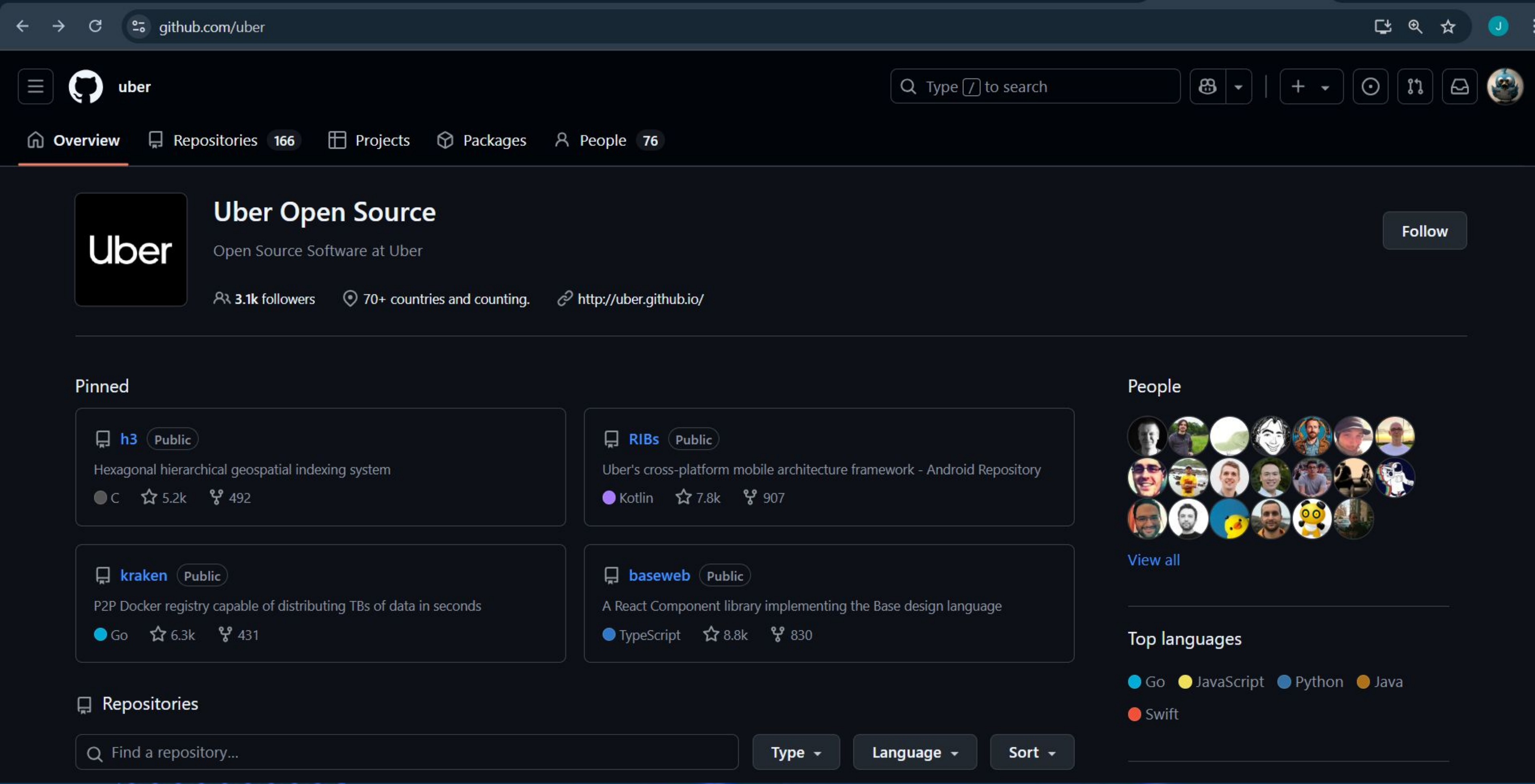

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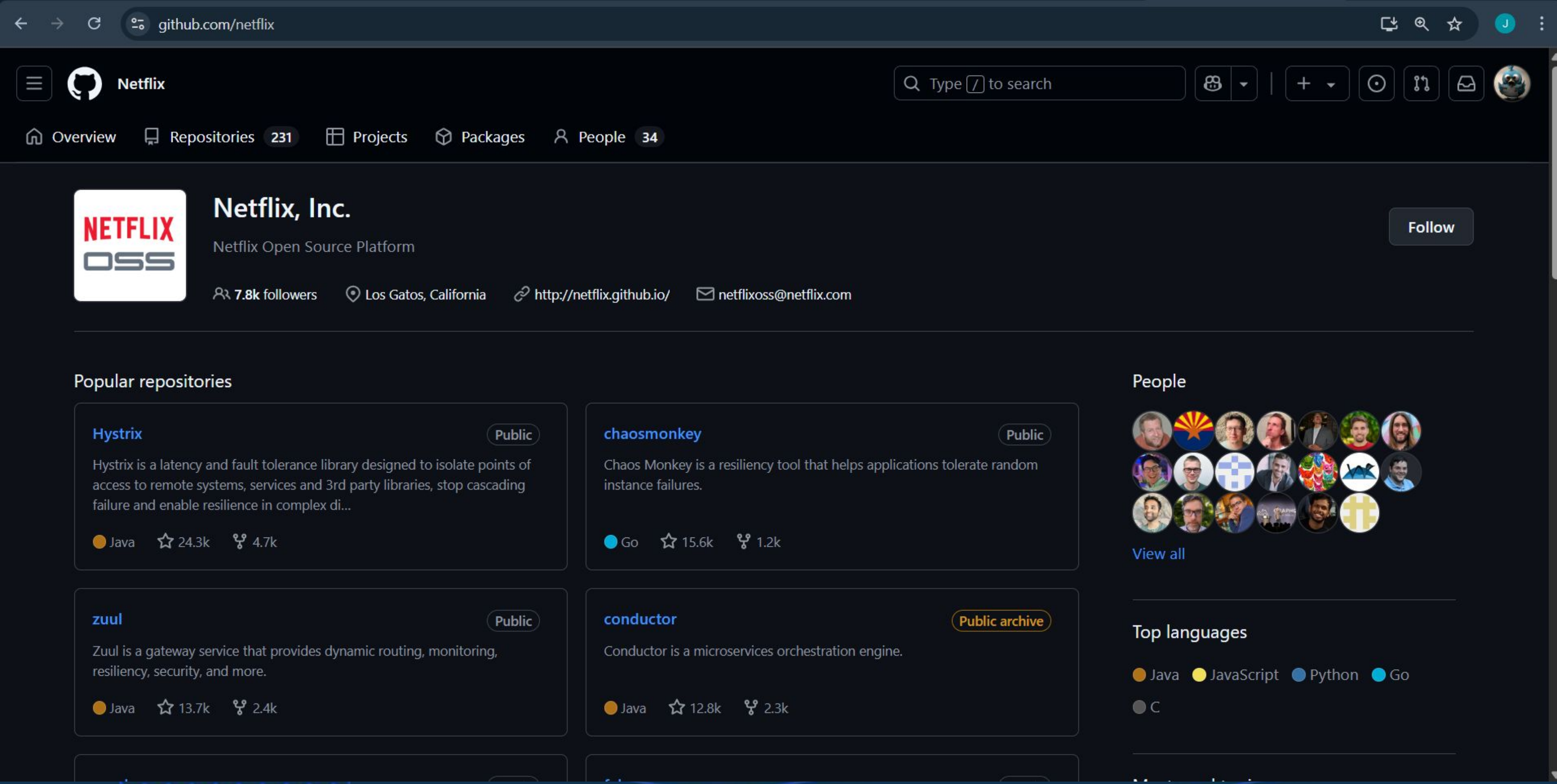

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Netflix Open Source Platform

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chaosmonkey Public
Chaos Monkey is a resiliency tool that helps applications tolerate random instance failures.
● Go ☆ 15.6k 1.2k

zuul Public
Zuul is a gateway service that provides dynamic routing, monitoring, resiliency, security, and more.
● Java ☆ 13.7k 2.4k

conductor Public archive
Conductor is a microservices orchestration engine.
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● Java ● JavaScript ● Python ● Go ● C

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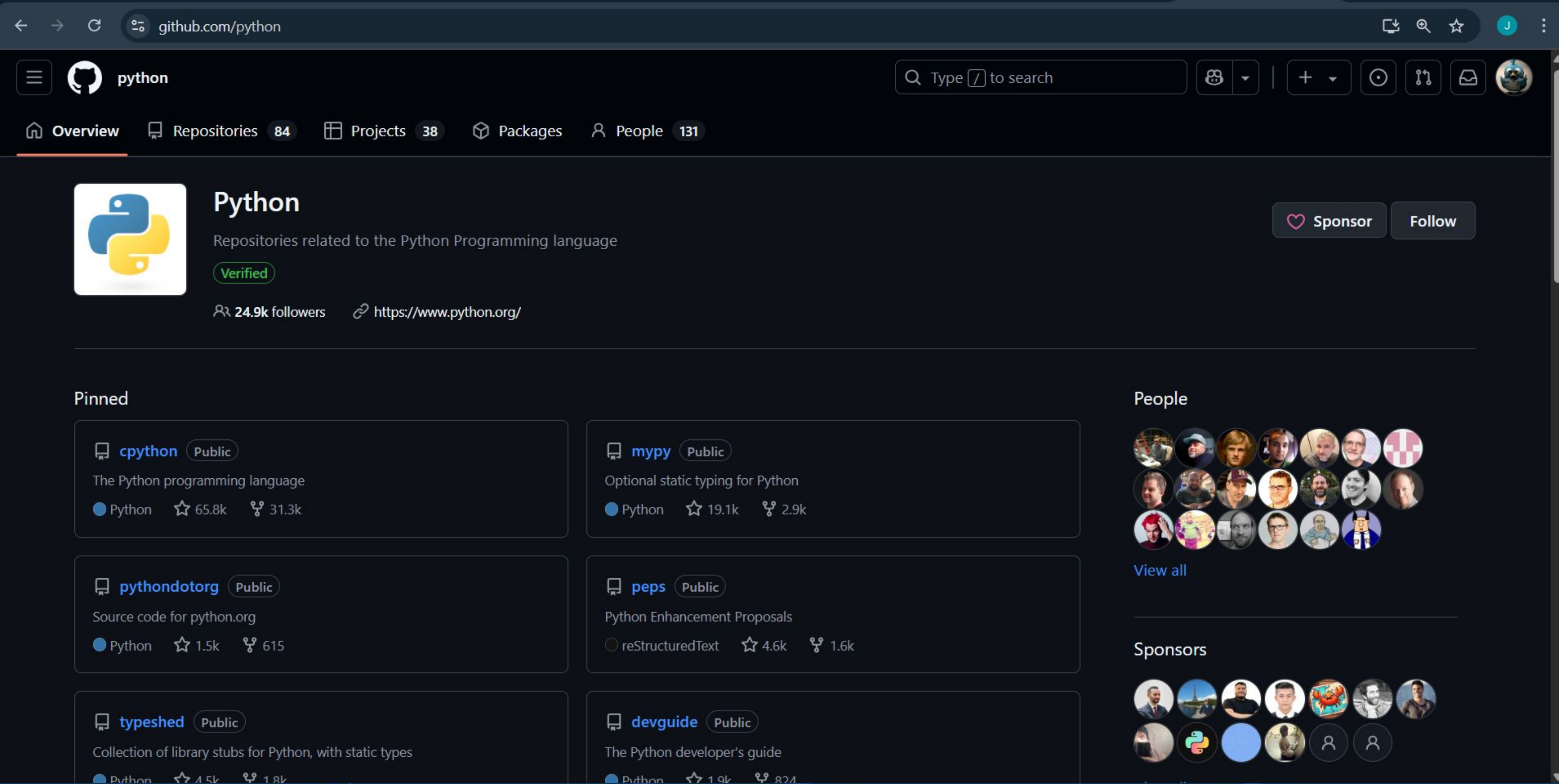

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Introduction

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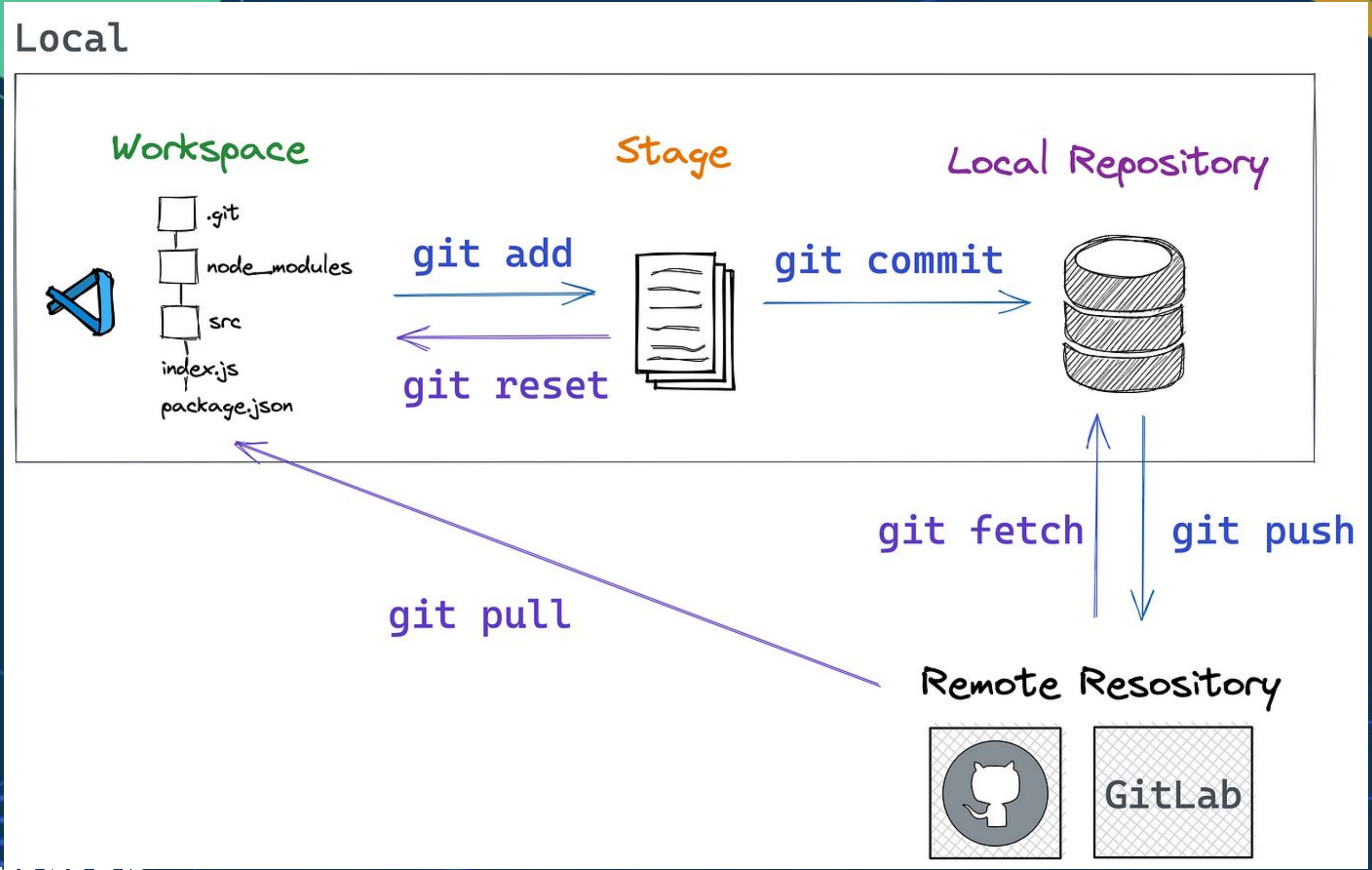
Recap



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Branching Strategies

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What Are Branches in Git?

- **What is a branch?**
  - A branch is like a separate workspace in your project where you can work without affecting the main code.
- **Purpose of the Main/Master Branch:**
  - The *main branch* (or master) is the stable, production-ready version of your project.
  - Changes merged here should always work as intended.
- **Why Protect the Main Branch?**
  - Prevent accidental changes by requiring reviews before merging.
  - Keep the project stable for releases or deployments.

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Feature Branches: Work Without Worry

- **What is a Feature Branch?**
    - A branch dedicated to developing a specific feature or fix.
    - Allows independent work without affecting others.
- **Why Use Feature Branches?**
    - Keep the main branch stable.
    - Organize your work better.
- **Branch Lifecycle:**
    - Create → Work → Test → Merge → Delete

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Feature Branches: Work Without Worry

- **Good Naming Practices:**
  - Be descriptive but concise.
  - Use formats like:
    - `feature/new-login-page`
    - `bugfix/fix-login-issue`
    - `hotfix/urgent-deploy-fix`
- **Why Naming Matters:**
  - Clear names help the team understand the branch’s purpose.
  - Avoids confusion in collaborative projects.
- **Tip:**
  - Use lowercase and dashes (`-`) for readability.
- Example list of well-named branches vs. poorly named branches:
  - ✅ `feature/add-user-auth`
  - ❌ `1234` or `newbranch`.

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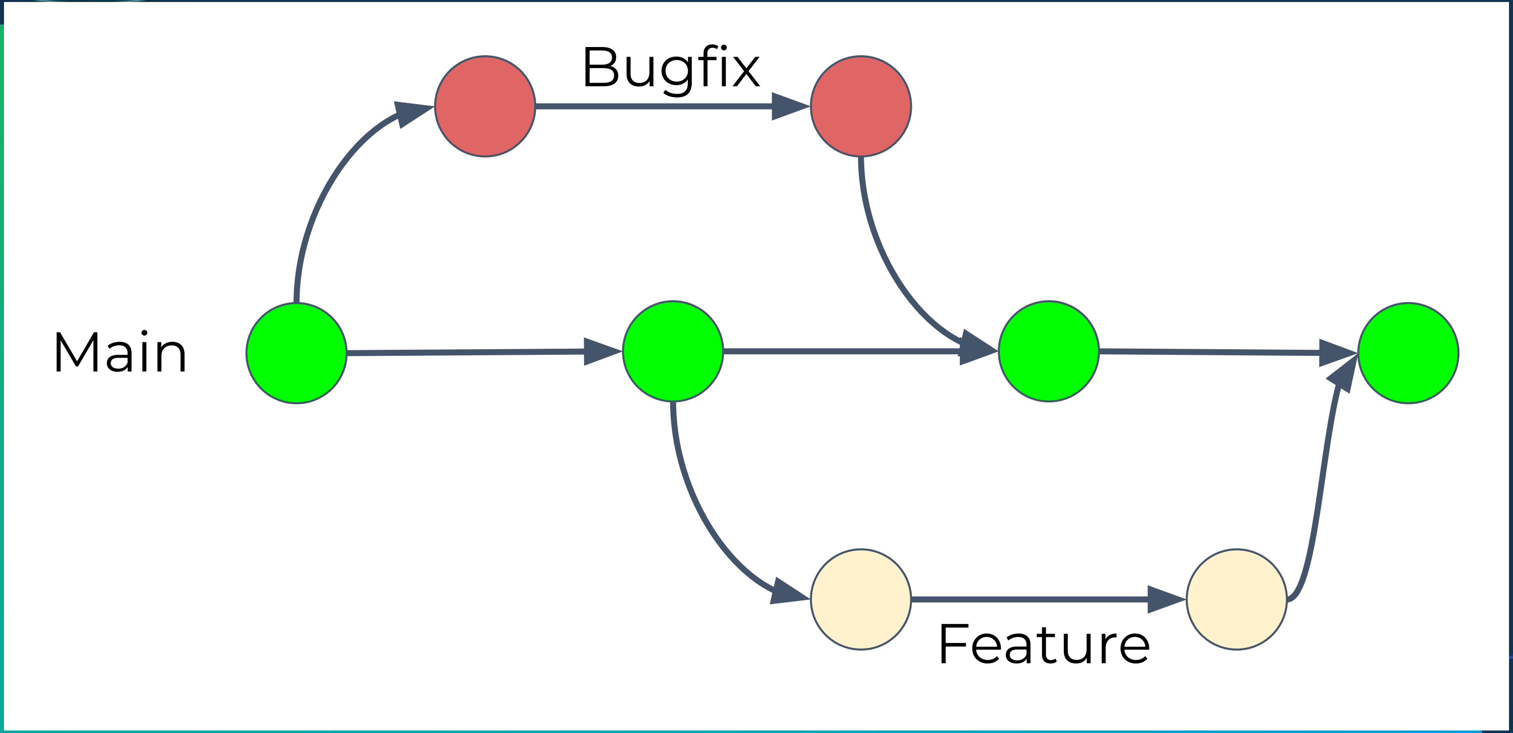
Branching Strategies: A Visual Guide



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Collaboration Fundamentals

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Understanding Remote and Local Repositories

- **What is a Remote Repository?**
  - A version of your repository hosted online (e.g., GitHub).
  - Accessible by your entire team, enabling collaboration.
- **Local vs Remote:**
  - *Local*: Stored on your computer.
  - *Remote*: Shared on a platform for teamwork.
- **Why Use GitHub? (Or GitLab, Bitbucket).**
  - Easy sharing, and collaboration tools, collaborate with others, back up your code, track changes over time.

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What is a Pull Request?

- **Purpose of PRs:**
  - A formal request to review and merge your work into a shared branch.
  - Encourages collaboration and ensures quality control.
- **When to Create a PR?**
  - After completing a feature or fix in your branch.
- **PR Workflow:**
  1. Submit a PR on GitHub.
  2. Request reviews from team members.
  3. Address feedback and make changes if needed.
  4. Merge your branch when approved.

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Code Reviews: Building Better Software Together

- **Why Code Reviews Matter:**
  - Catch bugs or issues early.
  - Ensure adherence to team coding standards.
  - Encourage knowledge sharing among team members.
- **Writing Effective PR Descriptions:**
  - Be clear and concise.
  - Describe ***what*** you did and ***why*** you did it.
  - Mention any specific areas needing attention during the review.
- **Best Practices for PRs:**
  - Small, focused changes (don’t lump multiple features).
  - Respond to feedback promptly.

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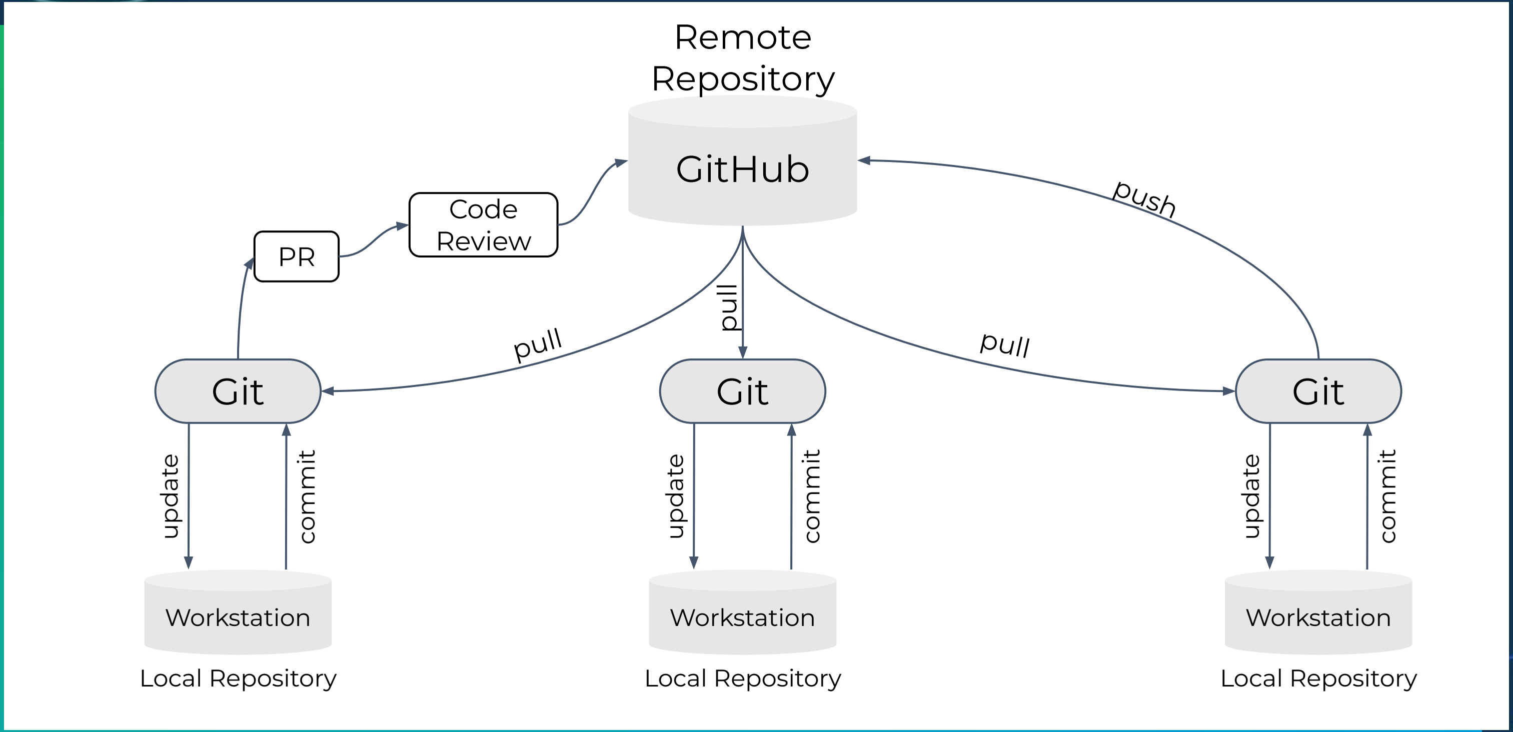
Pull Requests and Code Reviews



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Merge Operations & Conflict Resolution

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What is a Merge and Why Do We Need It?

- **What is a Merge?**
    - Combining changes from one branch into another.
    - Ensures all features and fixes come together.
- **When to Merge:**
    - After completing a feature or fix in a feature branch.
    - Before a release to ensure all work is integrated.

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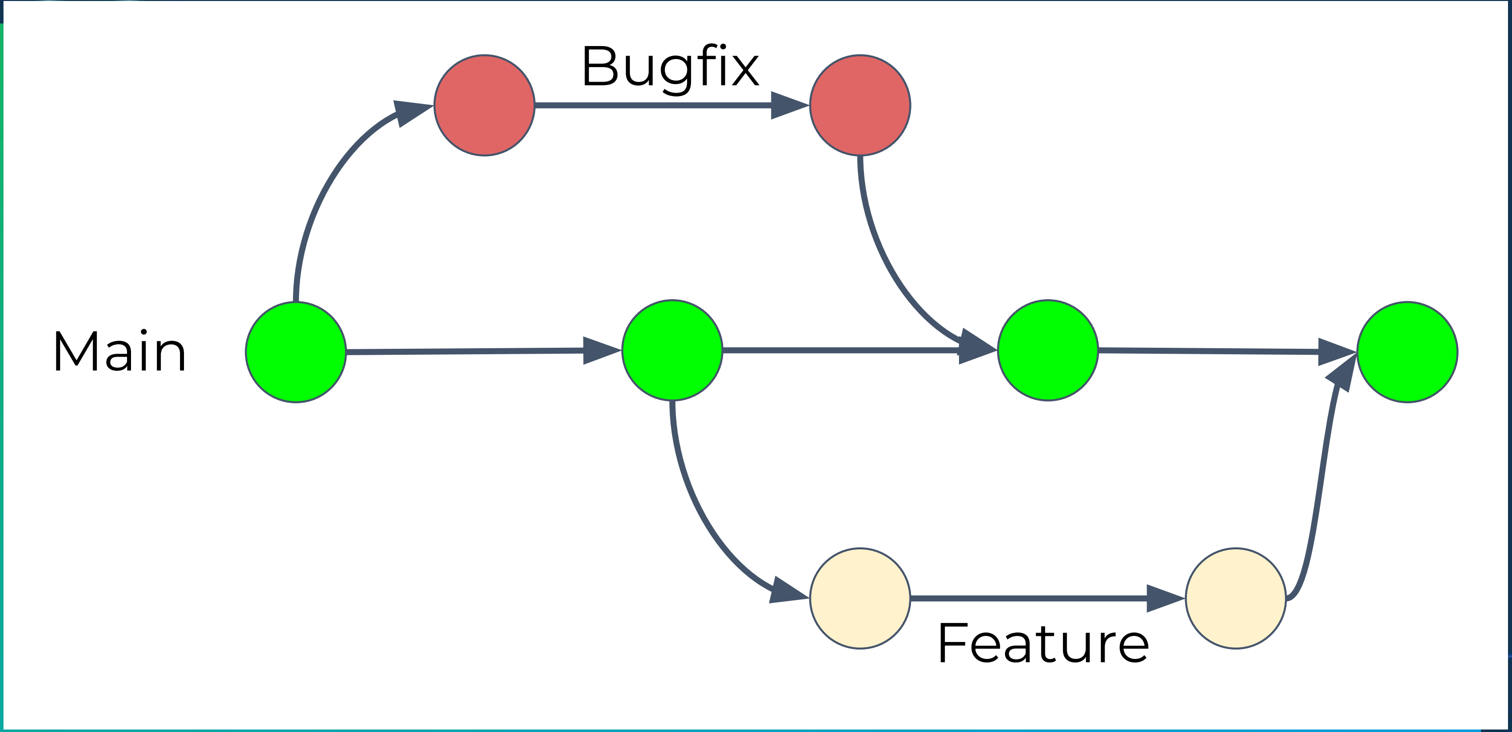
What Are Branches in Git?



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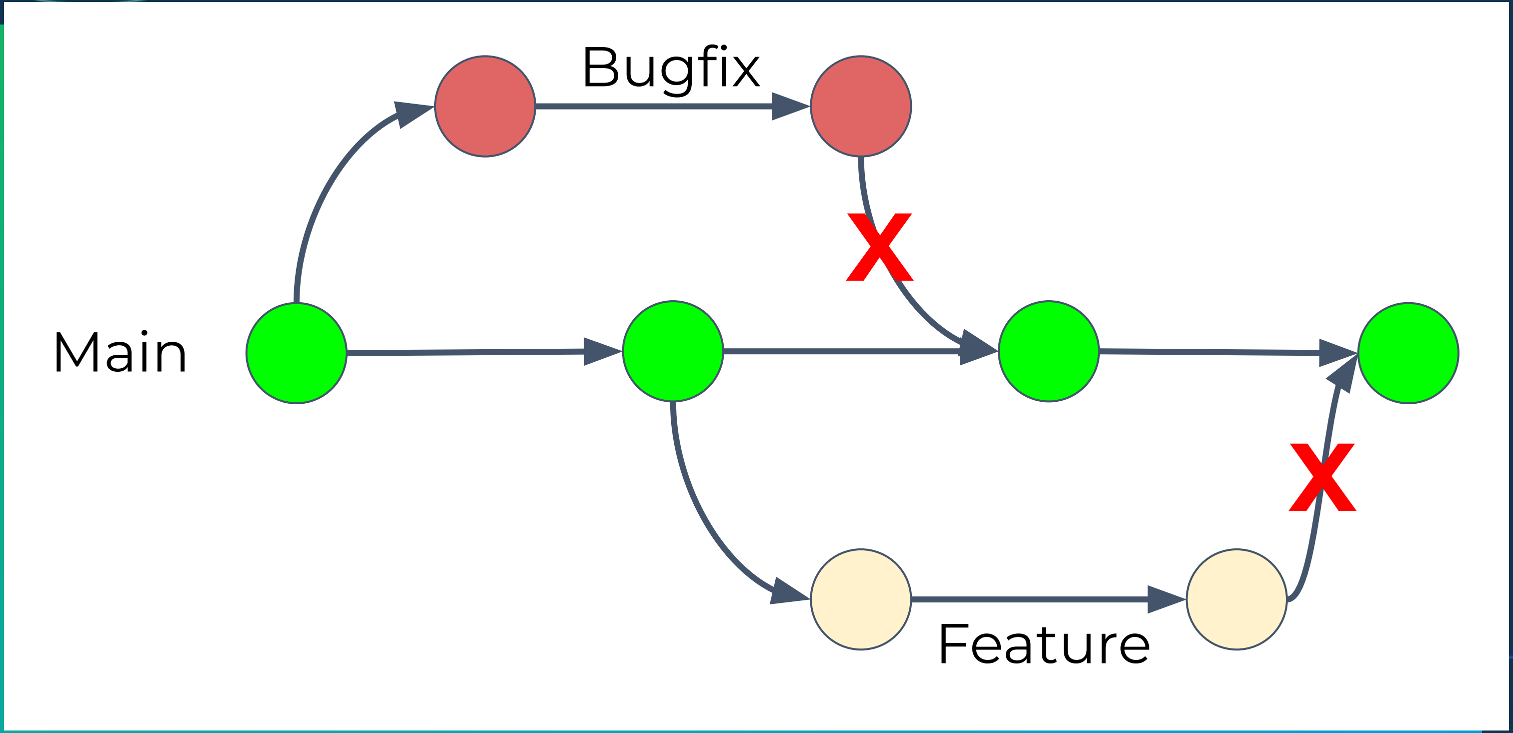
Handling Merge Conflicts



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Handling Merge Conflicts

- **Why Do Merge Conflicts Happen?**
    - Two branches modify the same line in a file.
    - Changes are made to the same file in ways Git cannot automatically combine.
- **How to Resolve Conflicts:**
    1. Identify the conflict (Git will mark files with conflicts).
    2. Edit the file to keep the desired changes.
    3. Mark the conflict as resolved (`git add`).
    4. Complete the merge (`git commit`).
- **Tools to Simplify Conflict Resolution:**
    - VS Code Git integration.
    - GitHub's conflict resolution editor.

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Best Practices & Tools

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Managing What Git Tracks with .gitignore

- **What is .gitignore?**
  - A file to tell Git which files or directories to ignore (not track).
  - Keeps sensitive or irrelevant files out of the repository.
- **Common Use Cases:**
  - Ignoring files like logs, temporary files, and environment variables.
  - Excluding OS or editor-specific files (e.g., `.DS_Store`, `*.swp`).
- **How to Use .gitignore:**
  - Add a `.gitignore` file at the root of your project.
  - Use patterns to specify ignored files (e.g., `*.log`, `/node_modules/`).
- **Best Practice:**
  - Always add `.gitignore` when initializing a project to avoid tracking unnecessary files.

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Guidelines for Effective Code Reviews

- **What is Code Review?**
  - A systematic examination of code by peers to improve quality and ensure adherence to team standards.
- **Review Guidelines:**
  - Focus on the code, not the person.
  - Check for functionality, readability, and adherence to standards.
  - Ensure the code is well-tested.
- **Providing Constructive Feedback:**
  - Be specific: "Consider renaming this variable to make it clearer."
  - Be polite: "What if we refactor this function for better readability?"
  - Avoid negative or personal comments.

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Using GitHub's Review Features Effectively

- **GitHub Review Features:**
  - Leave inline comments on specific lines of code.
  - Approve or request changes on pull requests.
  - Use suggestions for quick fixes.
- **Best Practices for Reviewers:**
  - Understand the feature's purpose before reviewing.
  - Test locally if necessary.
  - Avoid nitpicking minor issues unless they impact functionality.
- **Best Practices for Submitters:**
  - Write clear commit messages.
  - Use meaningful PR descriptions (what/why/how).
  - Address feedback promptly and update your PR.

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Git GUI Tools

GIT EXTENSIONS

GitKraken

https://git-scm.com/downloads/guis

Lesson Conclusion and Recap

Recap the key concepts and techniques covered during the lesson.

- **Branching Strategies:** Key strategies like feature branches and main branch usage help organise work and streamline collaboration.
- **Merging and Conflict Resolution:** Merging branches and handling merge conflicts ensure smooth integration of changes from different contributors.
- **Using .gitignore:** The .gitignore file helps manage which files to track or ignore, keeping the repository clean and focused.
- **Pull Requests (PRs) and Code Reviews:** PRs and code reviews support collaborative development, allowing team members to review, discuss, and improve code before merging.
- **Remote Repositories and GitHub Collaboration:** Leveraging platforms like GitHub enhances teamwork, making it easier to share, collaborate, and track project progress.

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Resources

Resources

- **Software:**
  - Git - Downloading Package
  - Download GitHub Desktop
- **Additional Resources**
  - Hello World - GitHub Docs
  - Get started with GitHub documentation
- **Books:**
  - Pro Git book

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Questions and Answers

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Thank you for attending

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