# FROM CHAOS TO FLOW

## GIT & BRANCHING STRATEGIES

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# WHY
## WE NEED VERSION CONTROL

### Track Changes

Complete history with **timestamps** and **author** info

### Team Collaboration

Multiple developers on **same project** without conflicts

### Easy Revert

Quickly **undo mistakes** and return to any version

### Branching

Create **parallel versions** for features and experiments

### Backup

Your code is **safely stored** in multiple locations

### Performance

Operations are **fast and efficient** even with large projects

# OVERVIEW

## HOW GIT TRACKS AND MANAGES YOUR CHANGES


**Add Files**

```
git add file.txt
```

**Commit Changes**

```
git commit -m "Message"
```

**Push to Remote**

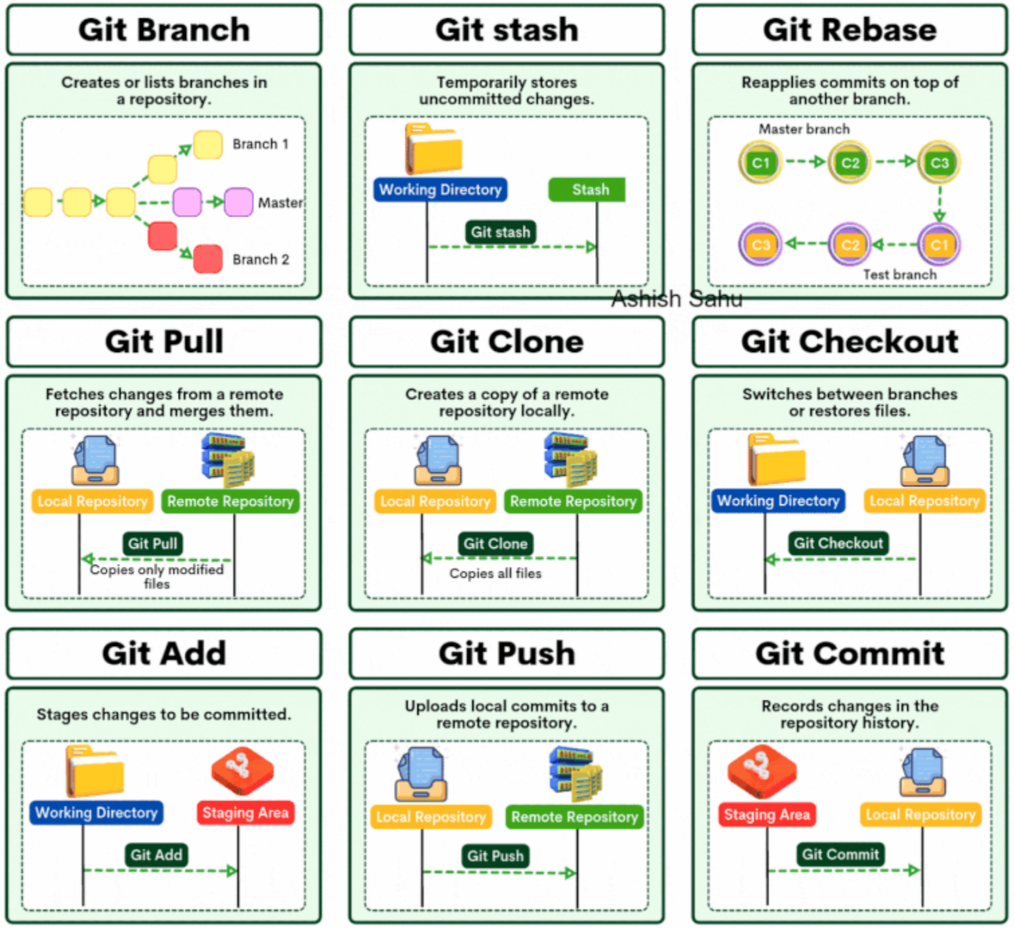
```
git push origin main
```

**Pull Changes**

```
git pull origin main
```

# GIT COMMANDS

## UNDERSTANDING THE BASIC GIT COMMANDS




Real-World Example Flow

```
# Clone project
git clone https://github.com/techversant-infos/branching-strategy.git
cd branching-strategy

# Create a new feature branch
git checkout -b feature/add-ICF-102-login

# Work and stage changes
git add .
git commit -m "feat(auth): add OTP-based login"

# Sync with main before pushing
git fetch origin
git rebase origin/main

# Push branch for PR
git push origin feature/add-ICF-102-login

# After approval
git checkout main
git merge feature/add-ICF-102-login
```

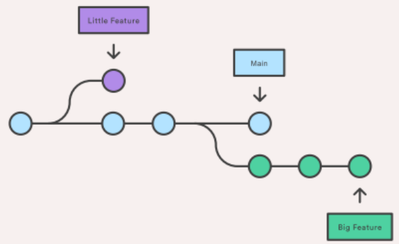
# BRANCHING

## CREATING AND MANAGING BRANCHES

### What is a Branch?

A **branch** is an independent line of development that allows you to work on features without affecting the main codebase

**Branch Visualization**




### Why Use Branches?

- Isolate new features
- Fix bugs safely
- Experiment without risk

### Create & Switch Branch

Create a new branch and switch to it

```
git checkout -b feature-branch
# Creates and switches to new branch
```

### Switch Branches

Move between different branches

```
git checkout main
git switch feature-branch
```

### Merge Branches

Combine changes from one branch into another

```
git checkout main
git merge feature-branch
# Merges feature-branch into main
```

Use **git branch -d** to delete merged branches

# COLLABORATION

## PULLING, MERGING, AND RESOLVING CONFLICTS

### Syncing with Remote

#### Pull Changes

Fetch and merge changes from remote repository

```
git pull origin main
# Fetches and merges remote changes
```

Always **pull before pushing** to avoid conflicts

#### Fetch Changes

Download changes without merging

```
git fetch origin
git merge origin/main
# Two-step alternative to pull
```

### Merging & Conflicts

#### Merge Branches

Combine changes from different branches

```
git checkout main
git merge feature-branch
# Merges feature-branch into main
```

#### Resolving Conflicts

When Git can't automatically merge changes

1. Open conflicted files in editor
2. Resolve conflicts manually
3. Stage resolved files
4. Complete the merge with commit

Use **git status** to see conflicted files

# MERGE CONFLICTS

## WHAT A MERGE CONFLICT LOOKS LIKE


That's exactly what happens in Git — it's called a **merge conflict**.

**Git shows something like this inside the file:**

```
<<<<<<< HEAD
driver.findElement(By.id("username")).sendKeys("admin");
driver.findElement(By.id("password")).sendKeys("admin123");
=======
LoginPage loginPage = new LoginPage(driver);
loginPage.login("admin", "admin123");
>>>>>>>feature/login-page-refactor
```

**Let's decode this:**

- `<<<<<<< HEAD` → Code from **your current branch** (e.g., master)
- `=======` → Divider between both versions
- `>>>>>>>` feature/login-page-refactor → Code from the **other branch**

**It's Git saying: "**I found two versions of this part — please tell me which one to keep."

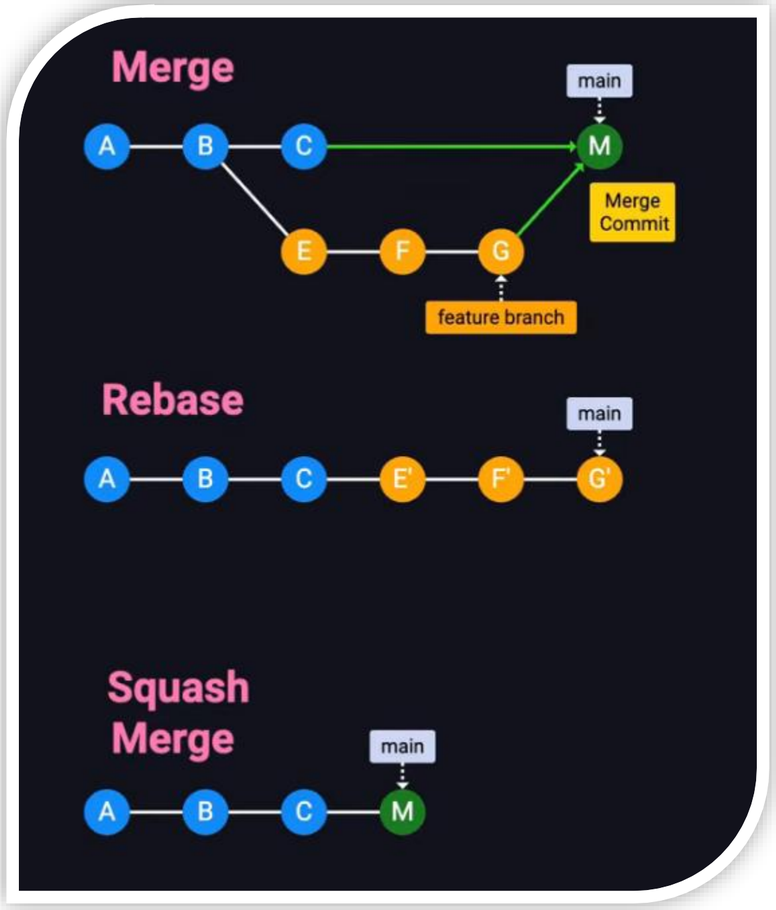
# RESOLVING CONFLICTS

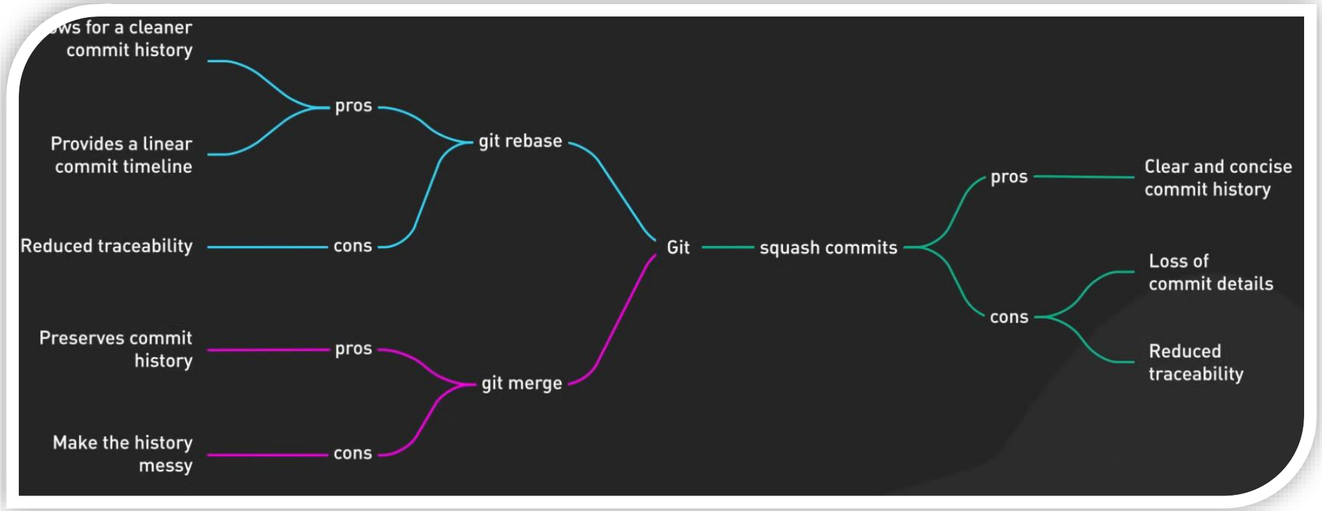
## HOW TO RESOLVE CONFLICTS

| Command | Meaning |
| --- | --- |
| `git checkout master` | Switch to master branch |
| `git pull origin master` | Get the latest version of master |
| `git merge feature/login-page-refactor` | Try to merge the feature branch |
| **Conflict happens** | You fix it manually in the file |
| `git add src/test/java/tests/LoginTest.java` | Tell Git that you've fixed the conflict |
| `git commit -m "Resolved merge conflict using POM structure"` | Save your fix |
| `git push origin master` | Send your fixed code to GitHub |

# MERGE, REBASE & SQUASH

RESOLVING CONFLICTS

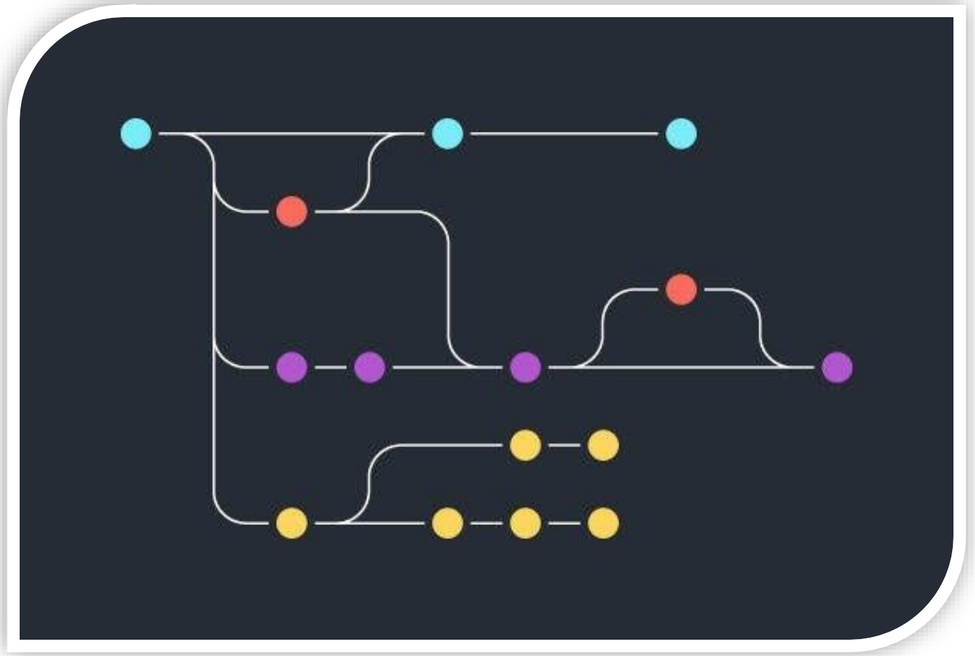


# WHAT
## IS BRACHING STRATEGY

A **branching strategy** is a structured way to manage how code changes are developed, tested, and merged in a Git repository.

It defines **where developers commit code**, **how they collaborate**, and **how features move from idea → production**.



# COMMON BRANCHING
# STRATEGIES

| Workflow | Ideal For | Key Users (2025) | Complexity |
|---|---|---|---|
| **GitHub Flow** | SaaS, CI/CD-heavy teams | GitHub, Vercel, Netlify | ⭐ |
| **GitLab Flow** | Teams aligning dev → staging → prod | GitLab, enterprise CI users | ⭐⭐ |
| **Git Flow (Classic)** | Release-based products | Atlassian, legacy apps | ⭐⭐⭐ |
| **Trunk-Based Development** | High-speed teams, microservices | Google, Meta, Uber | ⭐⭐⭐⭐ |
| **Feature Branching (Basic)** | Small to mid teams | Most startups | ⭐ |

1. GitFlow
2. GitHub Flow
3. GitLab Flow
4. Trunk Based Dev
5. Feature Branching

# WHAT IS **GITFLOW**

**Best For:**

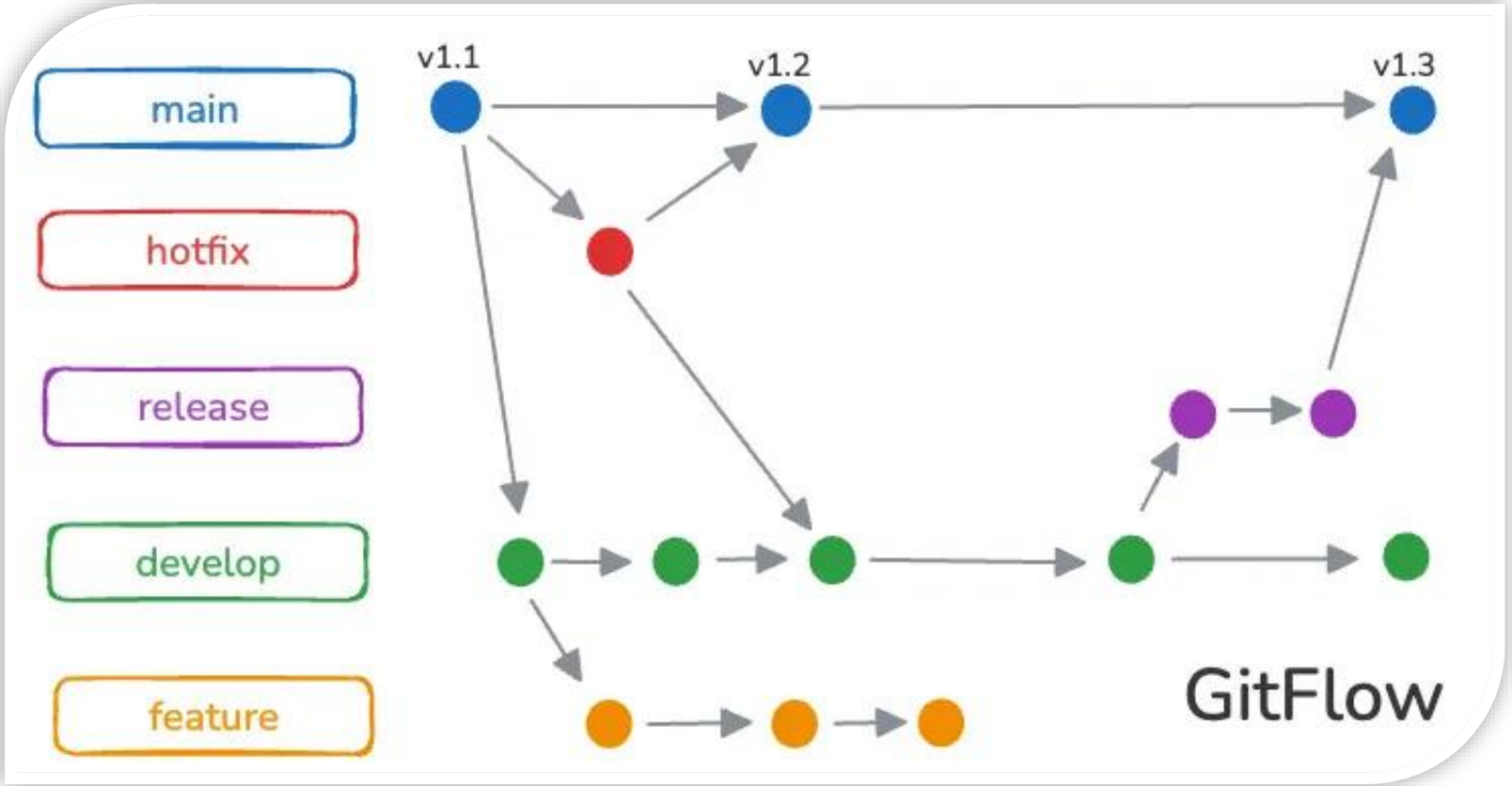
- Apps with planned releases (e.g., mobile, enterprise)
- Teams needing clear release versions

**Best Practices:**

- Tag releases
- Use consistent naming (release/x.x.x)
- Merge hotfixes into both main & develop

**Avoid when:**

- Fast-paced CI/CD teams
- Small teams (too heavy)



# WHAT IS
# GITHUB FLOW

**Best For:**

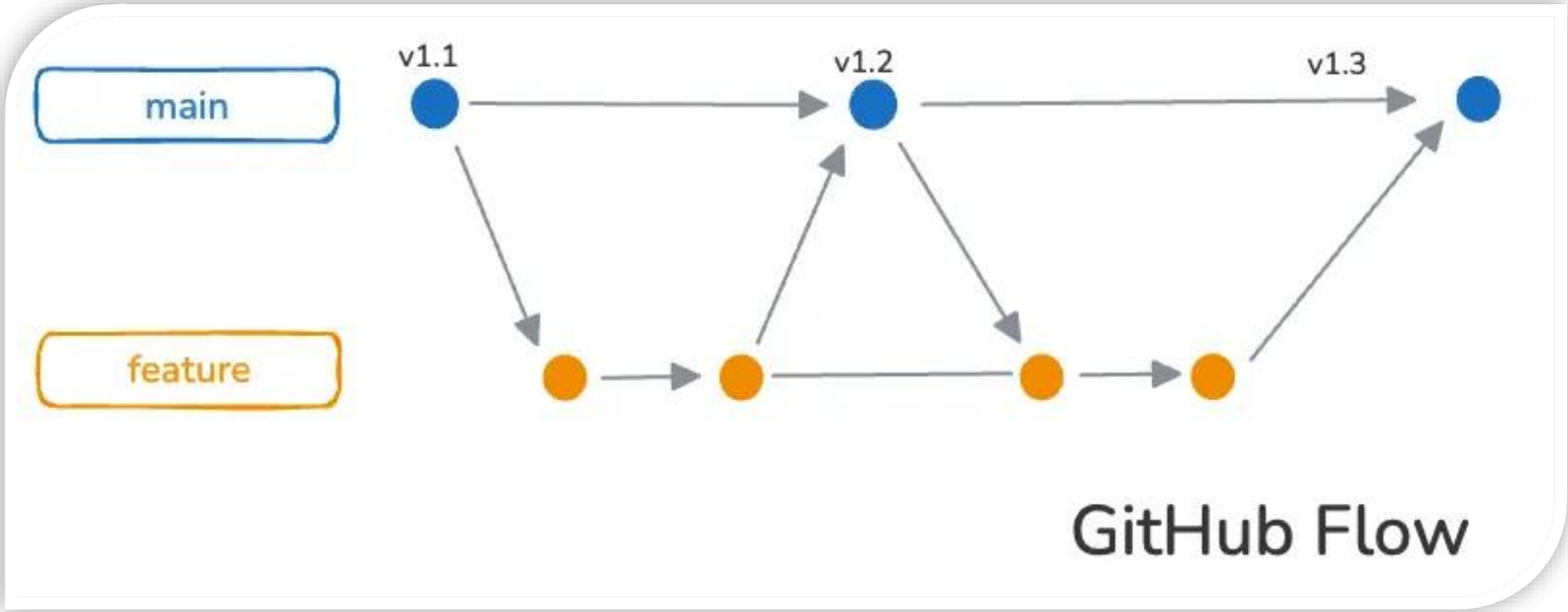
- Web apps with continuous deployment
- Teams using GitHub Actions, Vercel, or Netlify

**Best Practices:**

- Always deploy from main
- Keep branches short-lived
- Automate linting & testing

**Avoid when:**

- Complex release schedules
- Multiple environments



# WHAT IS
# GITLAB FLOW

**Best For:**

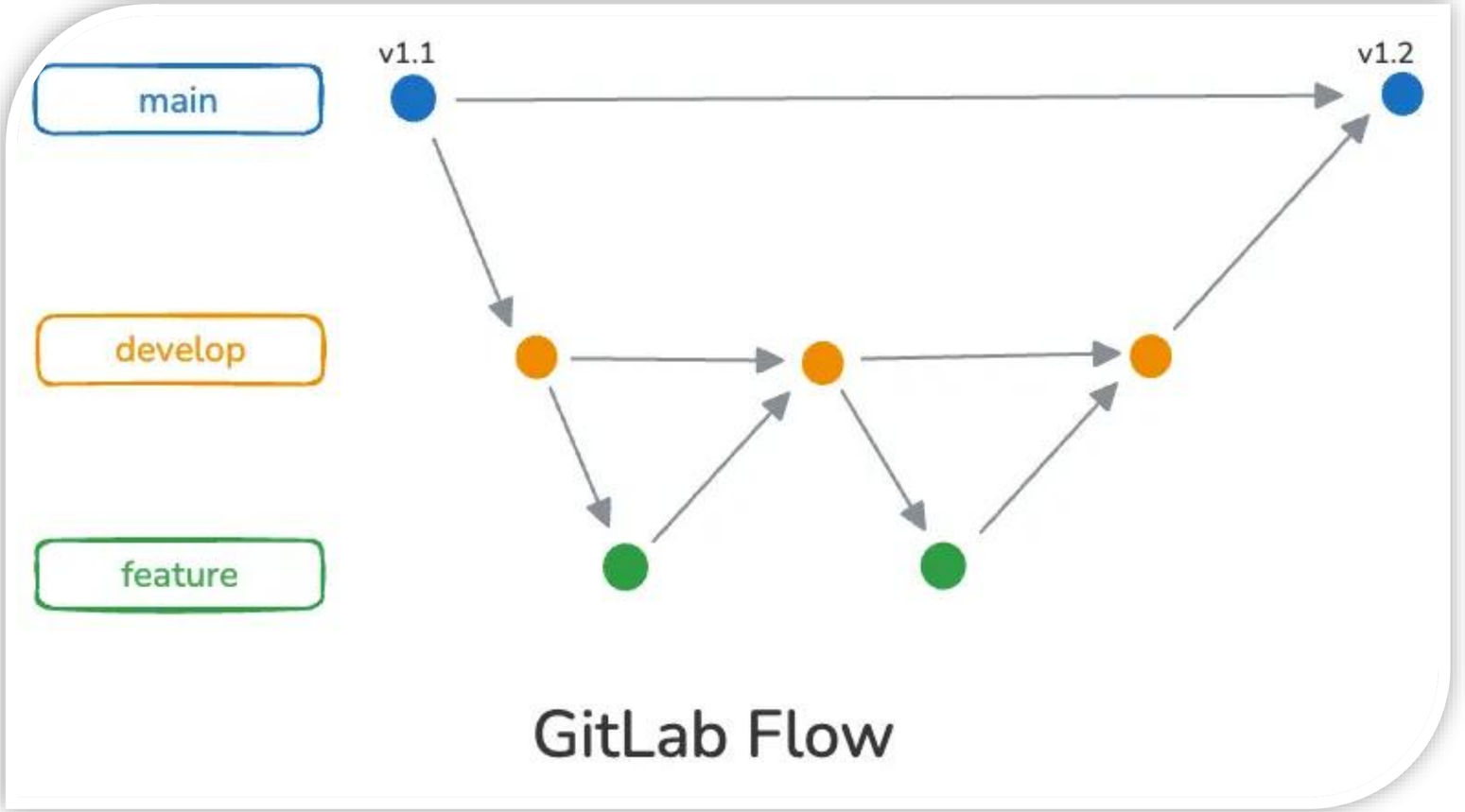
- Teams aligning code branches with environment stages
- GitLab CI/CD users

**Best Practices:**

- Enforce merge requests
- Protect production branch
- Automate staging → prod promotions

**Avoid when:**

- You need ultra-fast, continuous releases
- No real environment promotion

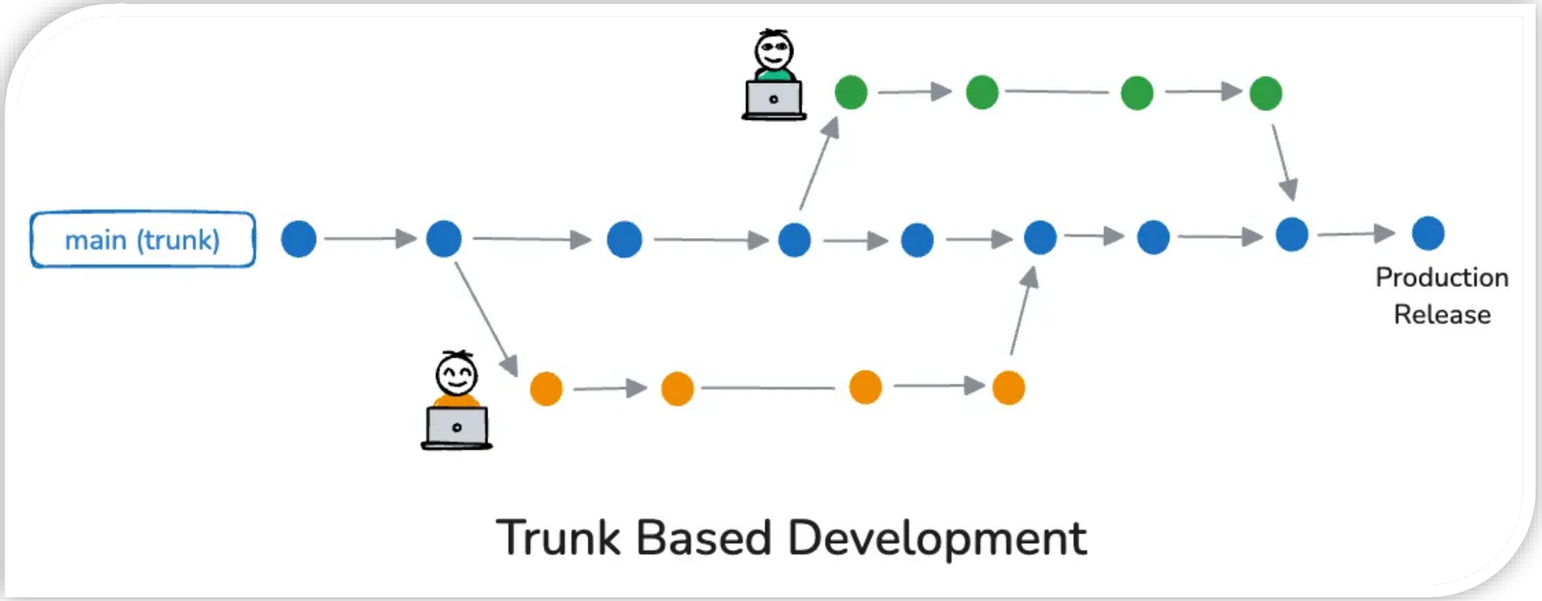


# WHAT IS
# TRUNK BASED DEV

**Best For:**
- Mature CI/CD pipelines
- Large, distributed teams

**Best Practices:**
- Feature toggles for unfinished code
- Frequent merges (daily)
- Strong automated testing

**Avoid when:**
- Teams without robust CI/CD
- Manual QA bottlenecks



WHAT IS

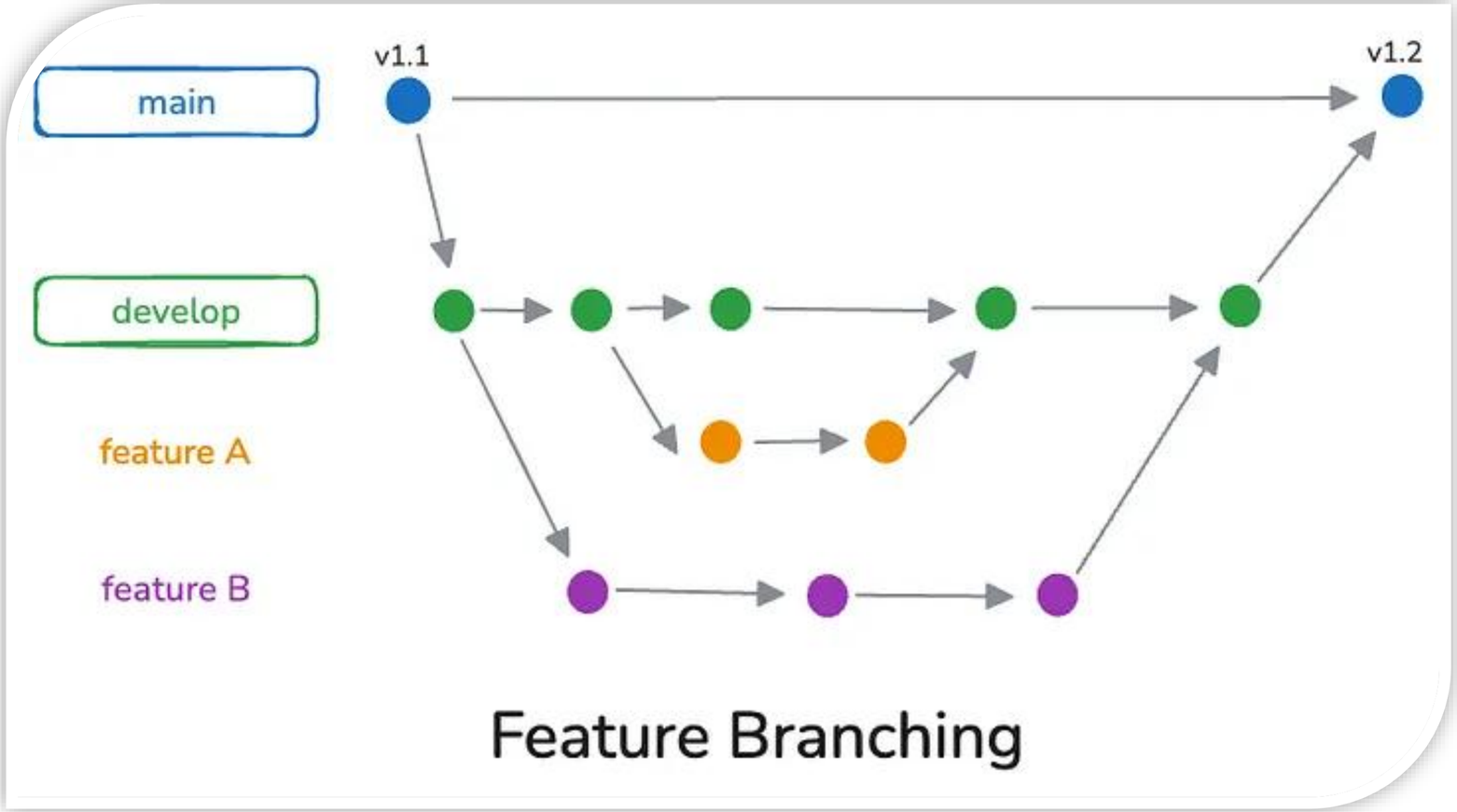
# FEATURE BRANCHING

**Best For:**

- Startups, small teams
- Ad-hoc release cycles

**Best Practices:**

- Use descriptive branch names (feature/user-auth)
- Keep branches under a week
- Use draft PRs for visibility



# CHOOSING THE RIGHT **STRATEGY**

1. How many **active contributors** commit daily?
2. Do you **ship** continuously or in fixed versions?
3. Do you have automated tests and **pipelines**?
4. Do you have dev/staging/prod **environments**?
5. Compliance: Are **audits** or version tags mandatory?

## DECISION MATRIX

| Team Size | Release Frequency | CI/CD Maturity | Recommended Workflow |
|---|---|---|---|
| Small | Low | Low | Feature Branching |
| Small | High | Medium | GitHub Flow |
| Medium | Medium | High | GitLab Flow |
| Large | High | Very High | Trunk-Based Dev |
| Enterprise | Low | Medium | Git Flow |
| Open Source | Open Source | Open Source | Open Source |

GIT

# BEST PRACTICES

- **main** is always deployable.
- Short-lived feature branches.
- PR review and CI validation are mandatory.
- Build once → Promote through environments.
- Every production deployment must be **tagged**.
- Follow **Conventional Commits** for clarity and automation.
- Keep the process transparent and reproducible.
- Use *.nocommit* or *.gitignore* to prevent committing sensitive or local-only files.
- Never commit environment variables or credentials; use .env.example templates.
- All projects must have *.editorconfig* and *.gitattributes* to maintain consistency.
- Handbook

# THANK YOU