

# Session 10 Instructor Guide: Version Control & Deployment

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## Learning Outcomes

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By the end of Session 10, students will be able to:

1. **Define version control** as a system for tracking file changes over time and describe development challenges it solves (lost work, breaking changes, collaboration conflicts)
2. **Execute the Git workflow** using add, commit, and push commands to save and share code changes, understanding Git as a “save system for your project”
3. **Distinguish between Git and GitHub** as local version control tool versus remote hosting platform
4. **Write meaningful commit messages** using the type(scope): description convention for readable project history, understanding commits as “journal entries” for your project
5. **Explain CI/CD automation** and how it transforms development workflows through continuous integration and deployment
6. **Implement automated deployment** using pre-configured GitHub Actions and GitHub Pages to publish React applications
7. **Monitor deployment processes** through GitHub’s Actions tab and verify successful builds
8. **Establish project ownership** by creating personal repositories and configuring deployment settings
9. **Share live applications** using public URLs and test functionality across different environments

## Instruction

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Instructor introduces key concepts students need to succeed:

1. **Version Control Philosophy** - Define version control as essential infrastructure for software development, emphasizing safety, collaboration, and history tracking
2. **Git Workflow Fundamentals** - Demonstrate the add, commit, push cycle as the foundation of version control workflows
3. **Git vs GitHub Distinction** - Explain Git as the version control tool and GitHub as the cloud-based hosting platform. Clarify how local repositories (in Codespaces) sync with remote repositories (on GitHub) via push/pull operations

4. **Commit Message Convention** - Introduce students to a common commit message format: type(scope): description. Explain that while commit messages can be any string, this convention improves collaboration, history tracking, and automated tooling
  5. **CI/CD Introduction** - Explain automated processes as modern development practice for efficiency and reliability
  6. **GitHub Actions Overview** - Describe GitHub's automation platform and its role in deployment workflows
  7. **GitHub Pages Configuration** - Set up free static site hosting with automated deployment integration
  8. **Let's Go Live!** - Launch the hands-on mission to publish student games to the internet using professional development workflows
  9. **Repository Ownership** - Guide students through disconnecting from starter repos and creating personal repositories for project ownership
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## Slide Deck Outline

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### Slide 1: Version Control & Deployment 🚀

- **Title:** "Session 10: Version Control & Deployment — Publishing Your Game"
- **Session 9 Recap:** "Last time: You built custom hooks with browser API integration and AI assistance"
- **Hook:** "Your game is awesome — now make it live!"
- **Today's Mission:** Learn version control concepts, implement Git workflows, and deploy to the internet using automated CI/CD
- **Visual:** Git workflow diagram with deployment pipeline
- **Connection:** "From local development to live web application!"

### Slide 2: Version Control - Tracking Your Changes 📋

- **Teaching Focus:** Why version control is essential for any serious development
- **Key Concepts:**
  - **Version control** as a system tracking file changes over time
  - **Problem-solving tool** for "it worked yesterday" and collaboration challenges
  - **Git** as the industry-standard version control system
  - **Repository** as project home containing code and complete history

- **Branch** as a separate copy of your code for safe experimentation
- **Problems Version Control Solves:**
  - **Lost work** - Complete change history prevents data loss
  - **Breaking changes** - Rollback to any previous working version
  - **Collaboration conflicts** - Multiple developers can work simultaneously
  - **Change tracking** - See exactly what changed, when, and why
  - **Safe experimentation** - Branches let you try new features without breaking main code
- **Real-World Context:** “Every professional developer uses version control daily”
- **Student Connection:** “You’ll use Git to save your progress and enable deployment”

### Slide 3: Learn the Git Workflow

- **Teaching Focus:** The fundamental workflow that powers all software development
- **Context Setting:** “Whether you’re fixing bugs, adding new features, or updating the design, you’ll need a reliable way to manage and publish changes. That’s where Git comes in.”
- **Git Introduction:** “Git is a version control tool that helps you track your progress, explain what changed, and safely update your project. It works alongside GitHub (where your code lives) and GitHub Actions (which automatically rebuilds and redeploys your site every time you push changes).”
- **Learning Objective:** “In this section, you’ll learn the three essential Git commands that power this workflow.”
- **Visual:** Git workflow diagram showing how changes move from computer to live website
- **Emphasis:** “Once you push your code, GitHub takes care of the rest and automatically updates your game online”
- **The Three Essential Commands:**
  - `git add .` - Stage your changes (“get them ready to save”)
  - `git commit -m "message"` - Save a snapshot with a message (“like a journal entry”)
  - `git push` - Upload to GitHub (“share with the world and trigger deployment”)
- **Visual Reference:**

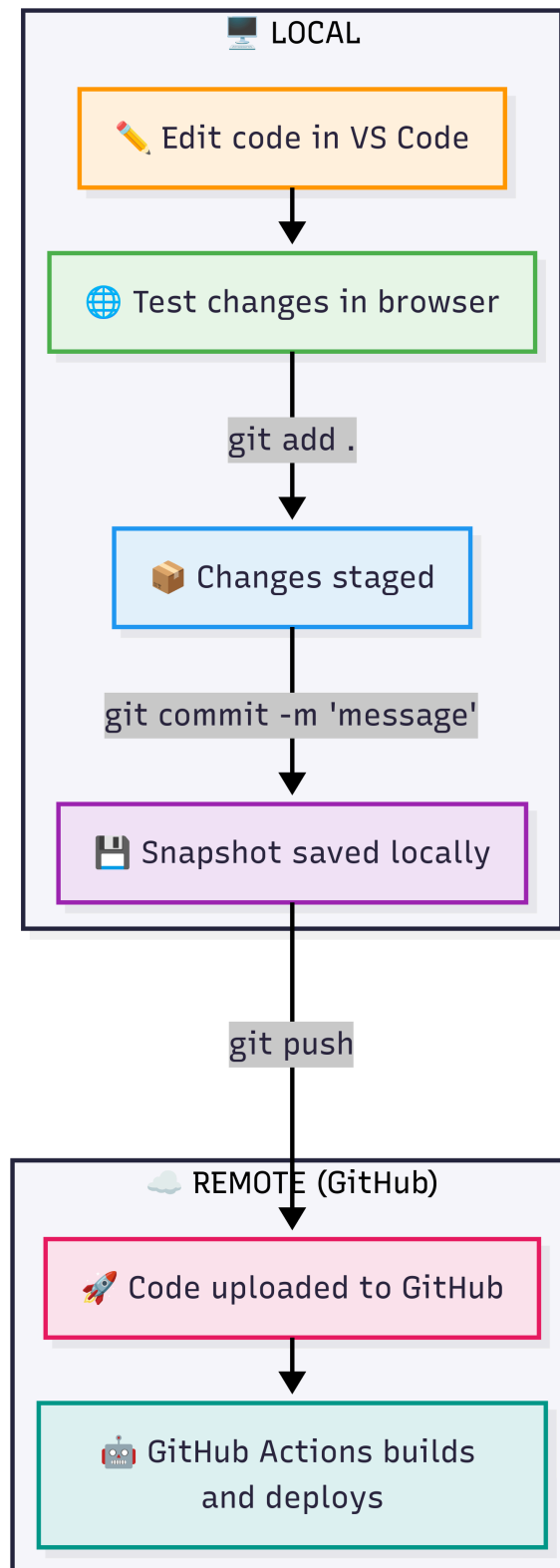


Figure: Git Development Workflow

- **Commit Message Convention:** Introduce the `type(scope): description` format with examples
- **Common Message Types Table:** Show feat, fix, style examples

- **Why It Matters:** “Whether you’re fixing a bug, adding a new feature, or updating the design, you’ll follow the same workflow every time. This process helps you record your progress, explain what changed, and publish updates to your live site.”
- **Student Application:** “This same pattern applies whether you’re fixing a bug, adding a feature, or updating styles”

## Slide 4: Git vs GitHub - Local and Remote

- **Teaching Focus:** Understanding the distinction between Git (local) and GitHub (remote)
- **Key Concepts:**
  - **Git** - Version control tool that runs on your computer (local)
  - **GitHub** - Cloud-based platform that hosts your repositories (remote)
  - **Local Repository** - Your project’s version history stored on your computer
  - **Remote Repository** - Your project’s version history stored on GitHub’s servers
- **How They Work Together:**
  - **Local work** - You edit, stage, and commit changes on your computer using Git
  - **Remote sharing** - You push commits to GitHub to share and back up your work
  - **Synchronization** - Local and remote repositories stay in sync through push/pull operations
- **Why Both Matter:**
  - **Local** - Fast, works offline, your personal workspace
  - **Remote** - Backup, sharing, collaboration, deployment triggers
- **Student Connection:** “Your Codespace has Git installed locally, and you’ll push to GitHub remotely”

## Slide 5: Commit Messages - Creating Readable History

- **Teaching Focus:** How commit messages create a readable project history
- **Key Concept:** Every commit requires a message (any string) that explains what changed - these messages create a readable history like a diary of your project’s evolution
- **Common Convention:** While commit messages can be any text, we’ll introduce a popular format: `type(scope): description`
  - **Type examples:** `feat` (new feature), `fix` (bug fix), `style` (visual changes), `docs` (documentation)

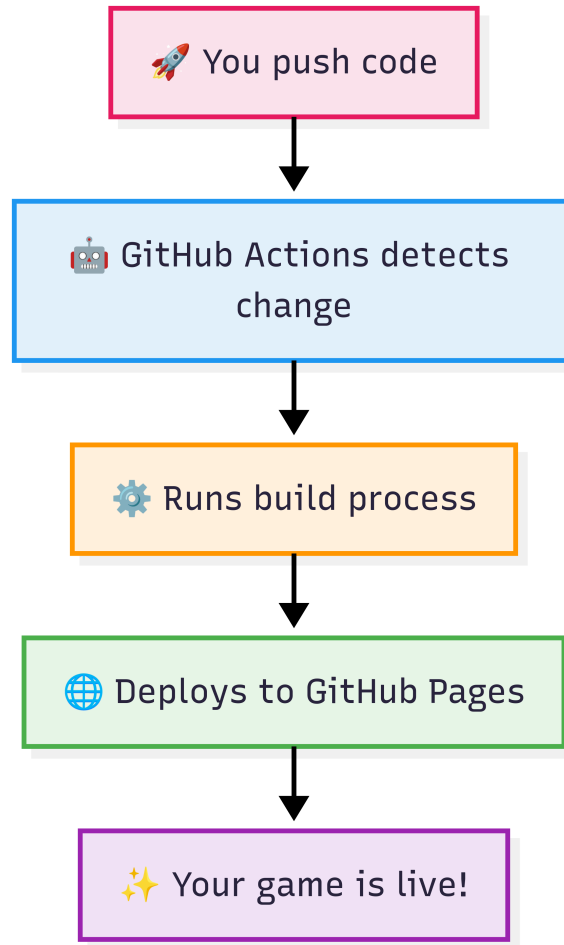
- **Scope examples:** `(quiz)`, `(scoring)`, `(logo)` - indicates what part of the app changed
- **Description:** Clear, concise explanation of what you actually did
- **Example:** `feat(logo): customize game title to Trivia Quest`
- **Why This Convention Helps:**
  - **Searchable history** - Easy to find specific types of changes
  - **Automated tools** - Many tools parse this format for release notes
  - **Team communication** - Consistent format improves collaboration
  - **Optional but valuable** - Teams choose conventions that work for them
- **Common Message Types:**

Type	Example	What It Means
feat	<code>feat(quiz): add timer</code>	New feature
fix	<code>fix(scoring): resolve bug</code>	Bug fix
style	<code>style(button): update colors</code>	Visual changes

- **Updated Student Connection:** “These three commands — add, commit, and push — are like the secret handshake of software development. Once you get the hang of these, you’re basically speaking the same language as the pros.”

## Slide 6: CI/CD - Automation That Changes Everything

- **Teaching Focus:** How automation transforms development workflows
- **Key Concepts:**
  - **Continuous Integration (CI)** - Automatically test and build code changes
  - **Continuous Deployment (CD)** - Automatically deploy successful builds
  - **GitHub Actions** - GitHub’s automation platform for running workflows
  - **GitHub Pages** - Free hosting service for static websites
- **The Magic:** Push code → Automatic build → Automatic deployment → Live website
- **From Push to Publish:** “This diagram shows what happens behind the scenes when you push code. GitHub detects the change, runs your build process, and deploys your updated game automatically.”



*Figure: CI/CD Pipeline — GitHub Actions builds and deploys your app automatically*

- **Benefits:**
  - **No manual work** - Deployment happens automatically
  - **Consistent process** - Same steps every time, no human error
  - **Fast iteration** - Push changes, see results in minutes
- **Professional Context:** “This is how modern teams deploy apps dozens of times per day”
- **Student Impact:** “Your game updates automatically whenever you push code”

## Slide 7: GitHub Actions - Your Deployment Robot 🤖

- **Teaching Focus:** Understanding automated workflows and build processes
- **Key Concepts:**
  - **Workflow files** - YAML configurations defining automation steps
  - **Triggers** - Events that start workflows (like pushing code)
  - **Build process** - Converting React source code into deployable files

- **Deployment steps** - Publishing built files to hosting platform
- **What Happens During Build:**
  1. **Install dependencies** - Download required packages
  2. **Run build command** - Vite bundles React app for production
  3. **Optimize assets** - Compress images, minify code
  4. **Deploy files** - Upload to GitHub Pages hosting
- **Monitoring Builds:**
  - **Actions tab** shows workflow runs and status
  - **Green checkmarks** indicate successful deployments
  - **Red X marks** show failed builds with error details
- **Student Guidance:** “You’ll watch your first deployment happen in real-time”

## Slide 8: GitHub Pages - Free Hosting for Your Projects

- **Teaching Focus:** Understanding static site hosting and configuration
- **Key Concepts:**
  - **Static site hosting** - Serves HTML, CSS, and JavaScript files
  - **Perfect for React apps** - Built React apps are static files
  - **Free tier** - Unlimited public repositories get free hosting
  - **Custom domains** - Can use your own domain name (advanced)
- **Configuration Steps:**
  - **Repository Settings** → **Pages** section
  - **Source: GitHub Actions** (not legacy branch-based deployment)
  - **Automatic SSL** - HTTPS enabled by default
- **URL Structure:** `https://username.github.io/repository-name/`
- **Build Configuration:** Update `package.json` build script for correct base path
- **Student Outcome:** “Your game will have a real web address that anyone can visit”

## Slide 9: Go Live!

- **Today’s Coding Mission:**
  1. **Make project yours** - Disconnect from starter repo, create personal repository, and configure build settings



2. **Execute Git workflow** - Add, commit, and push your code
  3. **Set up GitHub Pages** - Configure automated hosting
  4. **Monitor deployment** - Watch your game go live
  5. **Test and share** - Verify functionality and get your public URL
- **Success Criteria:**
    - Personal repository with all your code
    - Successful automated deployment
    - Live game accessible via public URL
    - All features working in production
  - **Achievement:** “Your trivia game will be live on the internet for anyone to play!”

## [HANDS-ON WORK HAPPENS HERE]

### Slide 10: Deployment Success - You're Live! 🌐

- **Title:** “Celebrating Your Achievement”
- **What You've Accomplished:**
  - **Professional workflow** - Used industry-standard Git and CI/CD
  - **Live web application** - Your game exists on the internet
  - **Automated deployment** - Updates happen automatically
  - **Shareable project** - Others can play your creation
- **Your Public URL:** `https://username.github.io/repository-name/`
- **Sharing Your Work:**
  - **Social media** - Screenshot and share your game
  - **Portfolio addition** - Professional project for your resume
  - **Friends and family** - Let others experience your creation
- **Future Updates:** “Every time you push code, your live site updates automatically”
- **Professional Context:** “You've used the same deployment process as major tech companies”

### Slide 11: What's Next - Choose Your Adventure 🎯

- **Title:** “Preview of Session 11”

- **Today's Achievement:** "You published a complete React application using professional development workflows"
- **Next Challenge:** "Extend your game with personal features using AI assistance"
- **Concepts Coming:**
  - **Self-directed learning** - Choose your own features to add
  - **AI collaboration** - Use GitHub Copilot for advanced development
  - **Feature planning** - Design and implement custom enhancements
  - **Code quality** - Refactoring and optimization techniques
- **Extension Options Preview:**
  - **Starter Mods:** Custom fonts, character themes, instruction modals
  - **Power Mods:** Progress indicators, CSS variables, sound effects
  - **Beast Mods:** Player selection, character movement, theme toggles
- **Motivation:** "Your live game is now your playground — let's make it epic"