

Session 10 Instructor Guide: Version Control & Deployment

Learning Outcomes

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
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
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

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

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: Git Workflow - How to Save and Share Code

- **Teaching Focus:** The fundamental workflow that powers all software development
- **Visual:** Git workflow diagram showing working directory → staging → local repo → remote repo
- **Staging Area Explanation:** The staging area is Git’s “preparation zone” where you collect changes before making a permanent commit

```

---
config:
  layout: elk
  look: neo
---
flowchart LR
  Working["💻 Working Directory<br>(Your code files)"]
  Staging["📦 Staging Area<br>(Changes ready to commit)"]
  Local["📁 Local Repository<br>(Your commit history)"]
  Remote["☁ Remote Repository<br>(GitHub)"]

  Working -- "git add" --> Staging
  Staging -- "git commit" --> Local
  Local -- "git push" --> Remote

  Working:::workspace
  Staging:::staging
  Local:::local
  Remote:::remote

  classDef workspace fill:#fff3e0,stroke:#ff9800,stroke-width:2px
  classDef staging fill:#e8f5e8,stroke:#4caf50,stroke-width:2px
  classDef local fill:#e3f2fd,stroke:#2196f3,stroke-width:2px
  classDef remote fill:#f3e5f5,stroke:#9c27b0,stroke-width:2px

```

- **Key Commands and Staging Concept:**

- `git add .` - Stage all changes for commit
 - **Staging Area Purpose:** Acts as a “preparation area” between your working files and permanent commits
 - **Why Staging Exists:** Lets you choose exactly which changes to include in each commit
 - **Conceptual Flow:** Working Directory → Staging Area → Local Repository → Remote Repository
- `git commit -m "message"` - Create snapshot with description
- `git push` - Upload commits to remote repository
- **Why It Matters:** “This workflow powers every professional software project — mastering it sets you apart”
- **Student Application:** “This workflow becomes automatic with practice”

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	feat(quiz): add timer	New feature
fix	fix(scoring): resolve bug	Bug fix
style	style(button): update colors	Visual changes

- **Student Connection:** “Good commit messages help you and your team understand what changed and why”

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

```

---
config:
  layout: elk
  look: neo
---
flowchart LR
  Push["🚀 git push"]
  Actions["🤖 GitHub Actions<br>(Build Process)"]
  Pages["🌐 GitHub Pages<br>(Live Website)"]
  Users["👤 Users Access<br>Your Game"]

  Push --> Actions
  Actions --> Pages
  Pages --> Users

  Push:::action
  Actions:::automation
  Pages:::hosting
  Users:::audience

  classDef action fill:#fff3e0,stroke:#ff9800,stroke-width:2px
  classDef automation fill:#e8f5e8,stroke:#4caf50,stroke-width:2px
  classDef hosting fill:#e3f2fd,stroke:#2196f3,stroke-width:2px
  classDef audience fill:#f3e5f5,stroke:#9c27b0,stroke-width:2px

```

- **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"