Introduction to Git, GitHub and VS Code

DFDS Cloud Engineering

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Introduction

This presentation is available, both as MarkDown source and rendered PDF, in our open-source *Dojo* repository on GitHub.

https://github.com/dfds/dojo/blob/master/workshops/git-github-vscode-intro/

In this repo you can also find many other workshops and associated *katas*.

Prerequisites & assumptions

The exercises in this workshop has the following prerequisites:

- Up-to-date Windows 10/11 installation
- Have access to run things "as administrator"
- Computer account is in a `Dev` client OU, which has developer policies applied
- All work done in terminal means in a PowerShell terminal
- Windows Terminal is highly recommended, but not particularly needed here

Agenda (1)

- Git
  - Git concepts
  - Exercise: Install Git
  - Basic Git commands
  - Exercise: Get started with local Git repo
- GitHub
  - Demo: Walk-through of main GitHub features

Agenda (2)

- Visual Studio Code
  - Demo: Getting started with VS Code
  - VS Code extensions
  - Exercise: Installing VS Code
  - Demo: Cool VS Code features

Agenda (3)

- Tying it together
  - Configuring Git
  - Exercise: Examine and adjust Git configuration
  - SSH key authentication and GitHub
  - Walk-through exercise: Setup SSH key authentication for GitHub
  - Exercise: Clone a public GitHub repo locally
  - Exercise: Start tracking a local repo
- Overview of Git branches
- Where to go from here

Git

- Source Code Management (SCM) tool
- Free and open-source
- Created by Linus Torvalds in 2005 for development of the Linux kernel

Git concepts (1/2)

- Distributed Version Control System
- *Can* work 100% local
  - You can enable version control in any folder
  - No external server or service required
  - But you probably want one
- Tracks changes to files

Git concepts (2/2)

- Bundle changed files into a commit
  - Commit changes, or...
  - ...revert to previous commit
- Commits should be atomic and frequent

Exercise: Install Git

- Install via *Software Center*, or
- Download and install from https://git-scm.com/download/

Basic Git commands

Command	Effect
`init -b main`	Initialise a local Git repo in the current directory
`clone <repo>`	Createa a local clone of the repo at the specified URL
`pull`	Pull any remote changes from the remote repo (or *origin*)
`add <file>`	*Stage* specified, or all, files for a new *commit*
`commit -m <msg>`	Commit staged files and include the specified message
`push`	Push local commits to *origin*
`status`	Display status of staged files, and local vs. remote repo
`log`	Display the commit history of the repo

Exercise: Get started with local Git repo

- Create a common directory to store code, e.g.: `C:\code`
- Create a new sub-directory here (e.g. `github-workshop`), and initialise a local Git repo:

```
cd (New-Item -Name github-workshop -Type Directory)
git init
```

- Create a file, stage and commit it:

```
"Hello" | Out-File -Path hello.txt
git add hello.txt
git commit -m "Initial commit"
```

- Check the commit log to see details about your commit:
  - `git log`

GitHub

- Free for all, paid tiers available

Demo: Walk-through of main GitHub features

- Git-as-a-Service
- Issue tracking
- Kanban boards
- GitHub Actions

Visual Studio Code

Extendable, free, open-source code editor

Demo: Getting started with VS Code

- Overview
- Keyboard shortcuts ⌨️
  - `Ctrl` + `Shift` + `P` (or simply `F1`, apparently 🤯)
    - Show the (powerful!) command palette
    - Displays assigned shortcuts (learn and use them)
  - Cheat sheet and more info, see https://code.visualstudio.com/docs/getstarted/keybindings.
- Git integration

VS Code extensions

- VS Code is extendable via a wide range of extensions
- Features include:
  - VS Code UI themes
  - Auto-formatting code
  - Linting and security scanning
- Out-of-scope for this workshop

Exercise: Installing VS Code

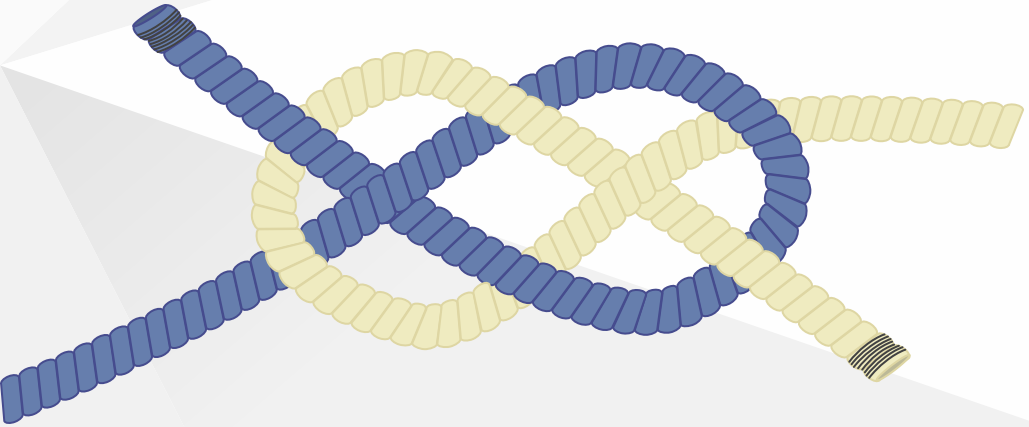
- Download and install from https://code.visualstudio.com/
- Local admin rights not required
- Built-in auto-update

Do not recommend installing via Software Center as this installs "per-machine", and has a slower update cycle.

Demo: Cool VS Code features

Short introduction to useful VS Code features, you can explore further on your own:

- Remote VS code - target WSL, remote computers, Docker containers
  - See Microsoft: VS Code Remote Development
- VS Code is built into GitHub - just press `.` when browsing a repo
- "Settings Sync" - syncronise your VS Code settings and preferences across devices
  - Including VS Code in GitHub
  - See https://code.visualstudio.com/docs/editor/settings-sync



Tying it together

Configuring Git

- Some settings need to be configured to work with remote repositories
- Git configuration has multiple scopes:
  - `system` : Machine-wide (`%PROGRAMFILES%\Git\etc\gitconfig`)
  - `global` : Current user, all repos (`%USERPROFILE%\.gitconfig`)
  - `local` : Current repo only (`.git\config`)
- The more specific scope, the higer precedence
  - `local` overrides `global` , which overrides `system`

Exercise: Examine and adjust Git configuration

- Examine the current Git configuration settings and their scope
- Configure name and email address
- Ensure default branch name for new repos is `main`
- Disable automatic End-of-Line character conversion

```
# List current configuration and scope
git config --list --show-scope

# Configure minimal user info and disable "autocrlf"
git config --global user.name "Jane Doe"
git config --global user.email jadoe@dfds.com
git config --global init.defaultbranch main
git config --global core.autocrlf false
```

SSH key authentication and GitHub

- SSH keys are assymetrical - they have a public and private/sensitive part
- You can add the *public* part of your SSH keys to your GitHub account
- With the private part of those SSH keys, you can authenticate against your GitHub account

Walk-through exercise: Setup SSH key authentication for GitHub (1)

- Add the SSH client capability to Windows (*must run as administrator/elevated*):
  - `Get-WindowsCapability -Online -Name OpenSSH.Client* | Add-WindowsCapability -Online`
- Enable `ssh-agent` (*must run as administrator/elevated*):

```
Get-Service ssh-agent | Set-Service -StartupType Manual
Start-Service ssh-agent
```

- Generate SSH key
  - `ssh-keygen -t ed25519`

Walk-through exercise: Setup SSH key authentication for GitHub (2)

- Add key to agent
  - `ssh-add $env:USERPROFILE\.ssh\id_ed25519`
- Configure SSH to use `ssh-agent` to authenticate against GitHub
  - Create or edit the file `%USERPROFILE%\.ssh\config` with VS Code
  - Ensure EOL is set to `LF` (Unix-style)
  - The file should include:

```
Host github.com
  ForwardAgent yes
```

Walk-through exercise: Setup SSH key authentication for GitHub (3)

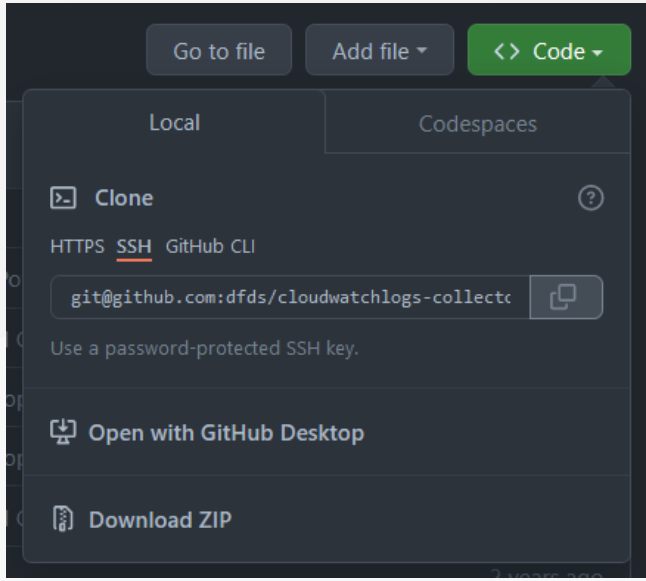
- Configure Git to use Windows' OpenSSH binary and config
  - `git config --global core.sshCommand "'$((Get-Command ssh).Source)' -T"`
- Copy public key to clipboard and add to GitHub profile
  - `Get-Content $env:USERPROFILE\.ssh\id_ed25519.pub | Set-Clipboard`
  - https://github.com/settings/keys
- Verify GitHub authentication
  - `ssh -T git@github.com`

Expected output:

```
Hi <GitHubUsername>! You've successfully authenticated, but GitHub does not provide shell access.
```

Exercise: Clone a public GitHub repo locally (1)

- Browse to any public GitHub repository
  - E.g. https://github.com/dfds/cloudwatchlogs-collector
- Click the green `Code` button
- Select the "SSH" tab
- Click the copy button next to the `git@github...` string
- Open a terminal and go your root code directory
- Type `git clone `, paste in the string from the clipboard and run the command
- Verify you have a sub-directory with the name and contents of the cloned repo



Exercise: Clone a public GitHub repo locally (2)

- Open the repository you just cloned in VS Code
  - `code <RepoName>` (or `code .` to open current directory)
- Make a few file changes
  - Create a new, modify and existing, delete another
- Examine how the changes are represented in VS Code
- In the terminal change into the repo directory, and run `git status`
- Delete the directory with the cloned repo

Exercise: Start tracking a local repo (1)

We are going to link the local repository, we created in an earlier exercise, to GitHub.

- Create a new repository in GitHub
  - https://github.com/new
  - The repo name does not **have** to match the directory, but it's recommended
- Change into the directory of the local repo in your terminal
- Ensure the local repo has at least one commit (check with `git log`)

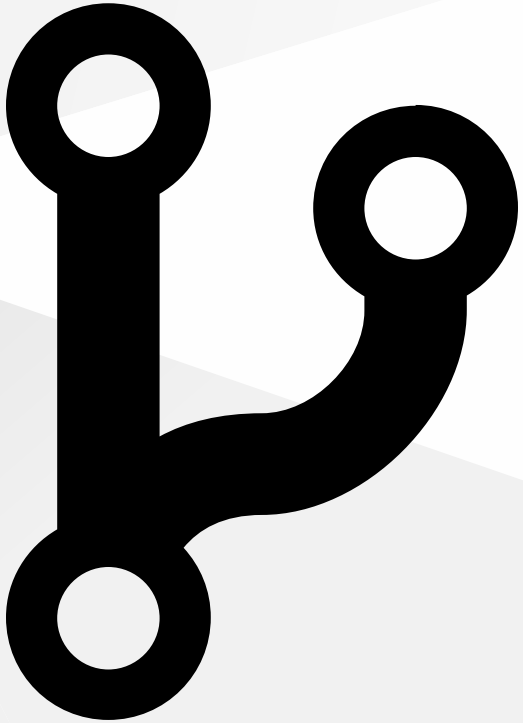
Exercise: Start tracking a local repo (2)

- Configure the new GitHub repo as the *origin* and push your local repo to it:

```
git remote add origin git@github.com:<GithubUsername>/<RepoName>.git
git branch -M main
git push -u origin main
```

Example of expected output:

```
Enumerating objects: 3, done.
Counting objects: 100% (3/3), done.
Writing objects: 100% (3/3), 217 bytes | 217.00 KiB/s, done.
Total 3 (delta 0), reused 0 (delta 0), pack-reused 0
To github.com:abstrask/github-workshop.git
 * [new branch]      main -> main
Branch 'main' set up to track remote branch 'main' from 'origin'.
```



Overview of Git branches

- Why branches?
- Pull Requests (PRs)
- Pull Reuest reviews
- Merge branch (to another branch)
- Branch protection

Where to go from here

- Familiarise yourself with MarkDown
  - Cheat sheet: https://commonmark.org/help/
  - Example: The MarkDown source of this presentation
- Repositories in GitHub
  - Create a sandbox repo
  - Add/modify files - both locally and directly in GitHub
  - Stage, commit and push changes
- Github issue management
  - Create issues in your sandbox repo
  - Assign people and labels to issues
  - Create a project board
  - Add issues to board, move them around