GIT TRAINING FOR IT PROFESSIONALS

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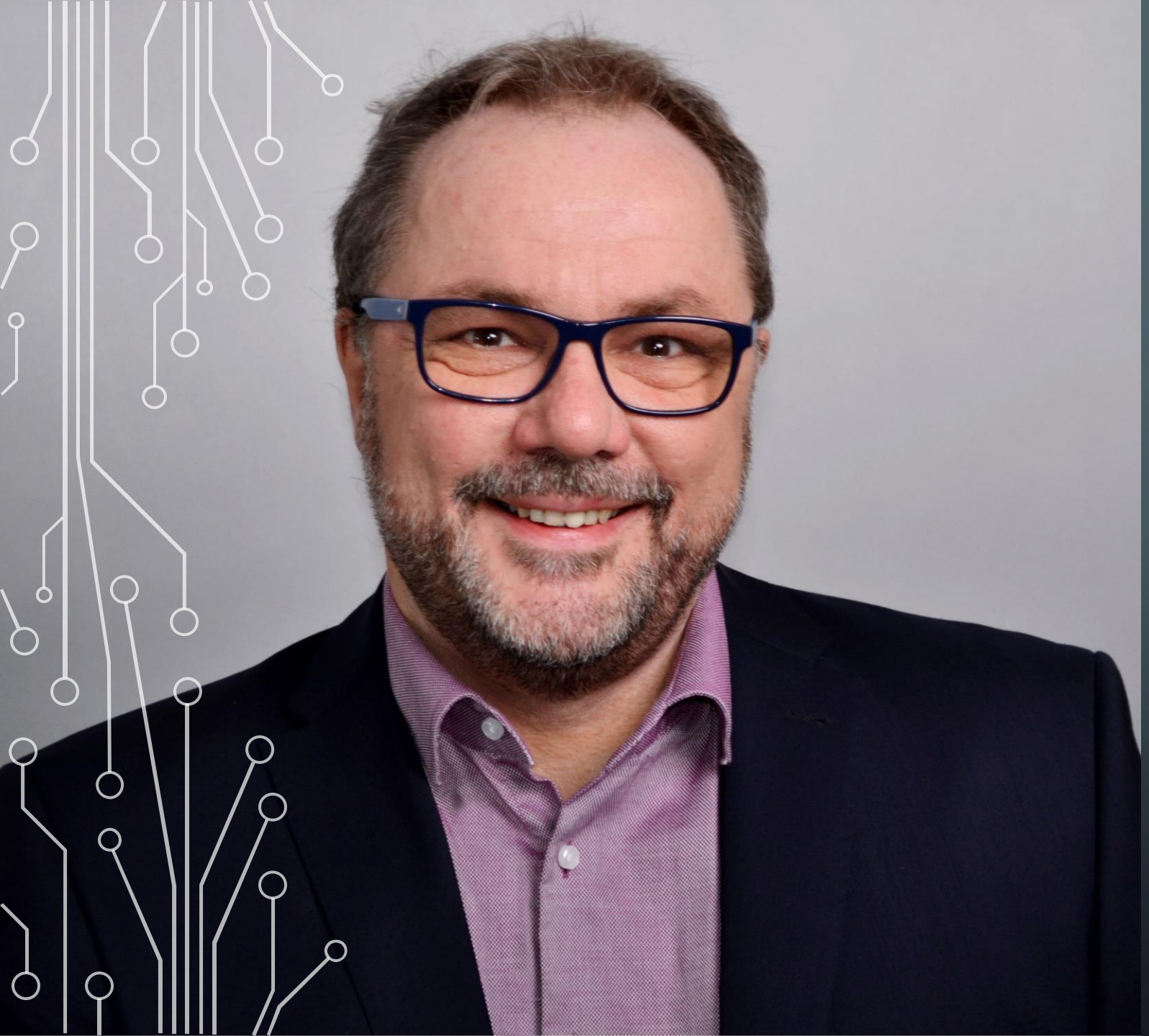
KWERLINGIT GMBH
1 SEPT 2023

WHO AM I

- Kristof Werling
- 31 years of experience at HP: DevOp, Developer, Architect
- Started KwerlingIT GmbH
- Focus: IT / Cyber Security
- Security Audits, IT consulting, Trainings, Software creation

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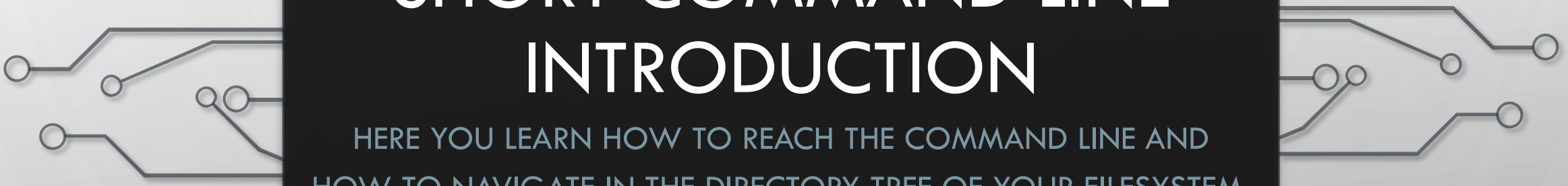
TABLE OF CONTENT

DISCLAIMER

- The presentation was created on a MS-Windows-based Computer
- Screen-shots are made, and explanation are based in the MS-Windows environment
- Wherever the author is aware of a significant difference between MS-Windows and Macintosh operating environments the slides will point out these differences.
- The author uses Github.com for all demonstration purposes



SHORT COMMAND LINE INTRODUCTION

HERE YOU LEARN HOW TO REACH THE COMMAND LINE AND HOW TO NAVIGATE IN THE DIRECTORY TREE OF YOUR FILESYSTEM.

ACCESSING THE COMMAND LINE

MS-WINDOWS

1. Open the "Start" menu.
2. Type "cmd" or "Command Prompt" in the search bar and press Enter.
3. This opens the Command Prompt window in your user directory.

MACINTOSH

1. Open the "Applications" folder.
2. Go to the "Utilities" folder.
3. Launch the "Terminal" application.
4. This provides the shell command line in your home directory.

SHOW CONTENT OF A DIRECTORY

MS-WINDOWS

- Type “dir“ and press Enter

MACINTOSH

- Type “ls“ and press Enter
- In order to get the same level of detail as with the “dir“ command type “ls -l“

SHOW CONTENT OF A DIRECTORY

MS-WINDOWS

- There are two special directory names: "." and ".."
- They exist in every directory and are needed for the OS to finds its way in the filetree.
- How to make use of them is shown in the explanation for relative paths.

MACINTOSH

- Same as for MS-Windows

SHOW CONTENT OF A DIRECTORY

MS-WINDOWS

```
GIT Training > dir
 Volume in Laufwerk C: hat keine Bezeichnung.
 Volumeseriennummer: 4E37-3A48

 Verzeichnis von C:\Users\Kwerling

03.09.2023  00:26    <DIR>          .
09.01.2023  18:37    <DIR>          ..
13.01.2023  02:12    <DIR>          .android
28.08.2023  16:30                53 .git-for-windows-updater
27.01.2023  13:50                59 .gitconfig
13.01.2023  02:12    <DIR>          .gradle
13.01.2023  02:15    <DIR>          .m2
03.09.2023  00:26                14 .minttyrc
09.01.2023  20:24    <DIR>          .vscode
09.01.2023  12:11    <DIR>          3D Objects
09.01.2023  20:47    <DIR>          AndroidStudioProjects
09.01.2023  18:55    <DIR>          Contacts
14.01.2023  22:35    <DIR>          Data
14.01.2023  22:35    <DIR>          Dev
14.01.2023  22:56    <DIR>          Documents
02.09.2023  23:02    <DIR>          Downloads
09.01.2023  18:55    <DIR>          Favorites
09.01.2023  18:55    <DIR>          Links
09.01.2023  18:55    <DIR>          Music
09.01.2023  18:57    <DIR>          OneDrive
30.08.2023  23:42    <DIR>          OneDrive - KwerlingIT GmbH
```

MACINTOSH

```
GIT Training > ls
'3D Objects'/
 AndroidStudioProjects/
 Anwendungsdaten@
 AppData/
 Contacts/
 Cookies@
 Data/
 Dev/
 Documents/
 Downloads/
 Druckumgebung@
'Eigene Dateien'@
 Favorites/
 IntelGraphicsProfiles/
 Links/
'Lokale Einstellungen'@
 Music/
 NTUSER.DAT
 NTUSER.DAT{a2332f18-cdbf-11ec-8680-002248483d79}.TM.blf
```

WHERE AM I IN THE DIRECTORY TREE

MS-WINDOWS

- Type "cd" and press Enter
- In MS-Windows the directory names are separated by a backslash ("\")
- In MS-Windows Drives exist. Each drive has a single letter followed by a colon as name ("c:", "f:"). Each drive has its own root directory.

MACINTOSH

- Type "pwd" and press Enter
- In Unix and macOS the directory names are separated by a slash ("/")
- Unix and macOS only have one root directory and the complete directory tree us reachable from there.

WHERE AM I IN THE DIRECTORY TREE

MS-WINDOWS

```
GIT Training > cd
C:\Users\Kwerling
```

MACINTOSH

```
GIT Training > pwd
/c/Users/Kwerling
```

MOVING IN THE FILESYSTEM

ABSOLUTE PATH

- An absolute path specifies the exact location of a file or directory from the file system's root directory (the top-level directory).
- It begins with the root directory's name (e.g., C:\ in Windows or / in Unix-like systems) and provides a complete path to the target file or directory.
- Absolute paths are not dependent on the current working directory and can be used to locate a file or directory from anywhere in the file system.
- Examples of absolute paths:
  - **Windows**: C:\Users\YourUsername\Documents\file.txt
  - **macOS/Linux**: /home/YourUsername/Documents/file.txt

MOVING IN THE FILESYSTEM

RELATIVE PATH

- A relative path starts either with a directory name or one or two dots ("." or ".."). "." (dot) represents the current directory, and ".." (dot-dot) represents the parent directory.
- A relative path specifies the location of a file or directory with respect to the current working directory.
- Examples (in Unix notation with "/"):
  - **Reports/file1.txt:** file "file1.txt" in the subdirectory " **Reports** " of the current directory
  - **../ Reports /file1.txt:** file "file1.txt" in the subdirectory " **Reports** " of the parent directory

MOVING IN THE FILESYSTEM

MS-WINDOWS

- Type "cd <directory>", where <directory> is the directory, you want to change to, and then press Enter.
- Directories can be named absolute or relative.

MACINTOSH

- Same as for MS-Windows

CREATING NEW DIRECTORIES

MS-WINDOWS

- Type "mkdir <directory>", where <directory> is the directory you want to create, and then press Enter.
- Directories can be named absolute or relative.
- "mkdir" can be abbreviated as "md"

MACINTOSH

- Same as for MS-Windows, but the abbreviation of "md does not exist.

REMOVE / DELETE A DIRECTORIES

MS-WINDOWS

- Type "rmdir <directory>", where <directory> is the directory, you want to delete, and then press Enter.
- Directories can be named absolute or relative.
- The directory must be empty.
- "mkdir" can be abbreviated as "rd"

MACINTOSH

- Same as for MS-Windows, but the abbreviation of "rd does not exist.

EXERCISES

MS-WINDOWS

- Open a new Command Prompt window
- Switch to the "AppData\Local\Temp" directory
- The content of the directory will look different for each user, as it is used by the OS and many applications

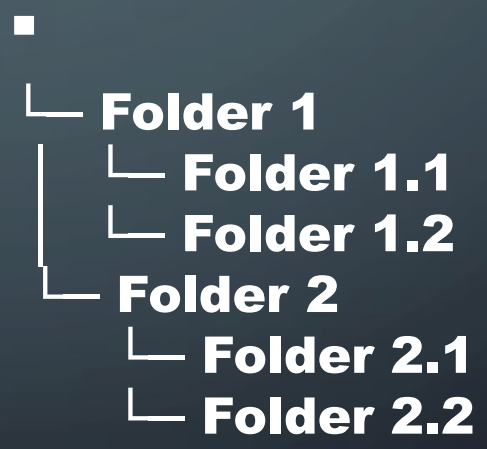
MACINTOSH

- Open a new Terminal window
- Switch to the "/tmp" directory
- The content of the directory will look different for each user, as it is used by the OS and many applications

EXERCISES

MS-WINDOWS AND MACINTOSH

- Build the directories and subdirectories as shown on the right-hand-side.



EXERCISES

MS-WINDOWS AND MACINTOSH

- Switch to directory "Folder 2"
- Delete directory "Folder 2.2"
- Goto to the parent directory
- Delete "Folder 2" --- What happens and how to delete the folder?
- Do the same for "Folder 1"
- Try to use absolute and relative path names for the directories you work with

INTRODUCTION INTO GIT

HOW TO WORK WITH GITHUB, GITLAB, BITBUCKET AND MANY OTHER PROVIDERS OF GIT REPOSITORIES

TECHNICAL ENVIRONMENT

- Git Repository Service Provider: Github
- IDE: IntelliJ
- Command line tools: standard git programs

TABLE OF CONTENT

WHY A VCS?

- Data Protection
  (prevent data loss / corruption)

- Collaboration
  (Multiple users can work on the same project in a controlled way)

- Auditing
  (tracking of changes on each file)

BASIC GIT CONCEPTS

- Repository (local or remote): Store for your files and their version history
- Commit: A new version of files stored to the repository version history.
- Branch: A forked specific version of the files in the repository
- Merge: Combining changes of one branch into another

INSTALLATION OF GIT

MS-WINDOWS

- Windows requires an installation

MACINTOSH

- There is a fair chance, that GIT is already installed on your machine.
- Verify it by opening a Terminal and type "git –version" followed by Enter
- If it is not installed see next slide

INSTALLATION OF GIT

- Goto: https://git-scm.com/downloads
- Depending on your OS follow the instructions on the page.
- Make sure that the git-command can be used from the command line
- There are also GUI Clients available from that page. No need to install any of them.

LOCAL CONFIGURATION

- It is necessary to configure your real name and email address:

- On the command line enter this:

```
git config --global user.name “<<Real name of user>>“

git config --global user.email “somebody@computer.com“
```

LOCAL CONFIGURATION

- There are 3 levels of configuration hierarchy:

Level	Explanation
system	Taken, when there is no global or local configuration
global	Taken, when there is no local configuration
local	Taken, if it exists

LOCAL CONFIGURATION

- If wished, a standard editor (or IDE) can be configured for viewing or editing text and source files:

```
git config --global core.editor "idea"
```

CREATION OF A REPOSITORY

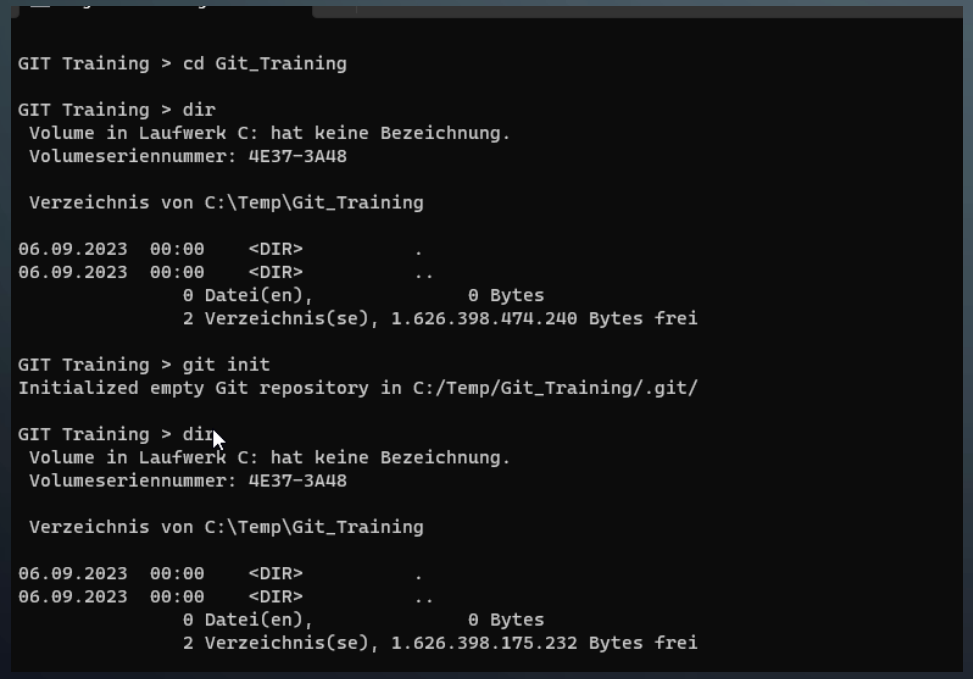
- "git init" create a new git repository in the directory it is executed in
- If there are files or directories in this directory, then these will not be added to the repository automatically.
- After execution there will be a new directory by the name of ".git". It stores the content of the repository as well as the needed information for the repository management.

EXCERCISE: CREATE A NEW LOCAL REPOSITORY

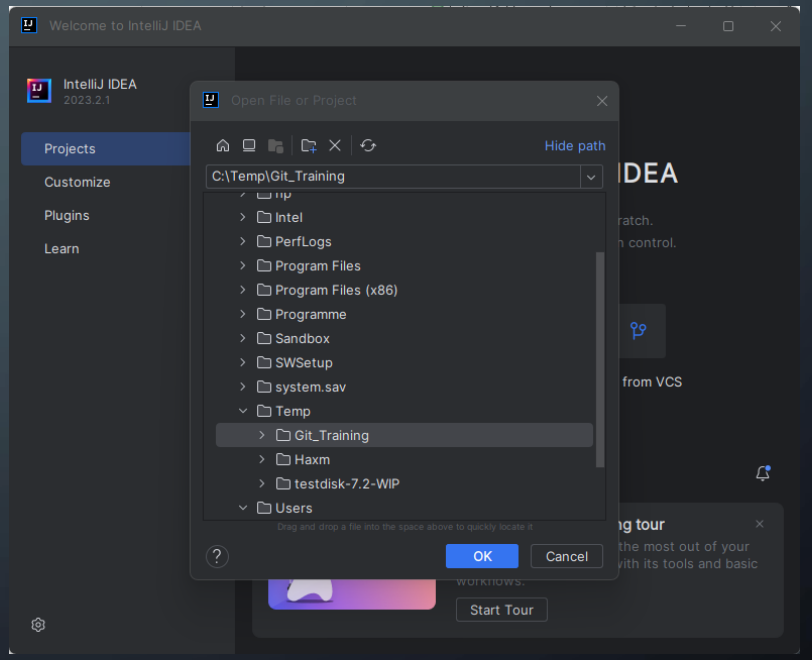
- Open a Terminal window
- Goto an empty directory
- Verify that it is empty
- Run the "git init" command
- Verify that the ".git" directory exists
- Have a look into that directory

EXCERCISE: CREATE A NEW LOCAL REPOSITORY

COMMAND PROMPT



INTELLIJ

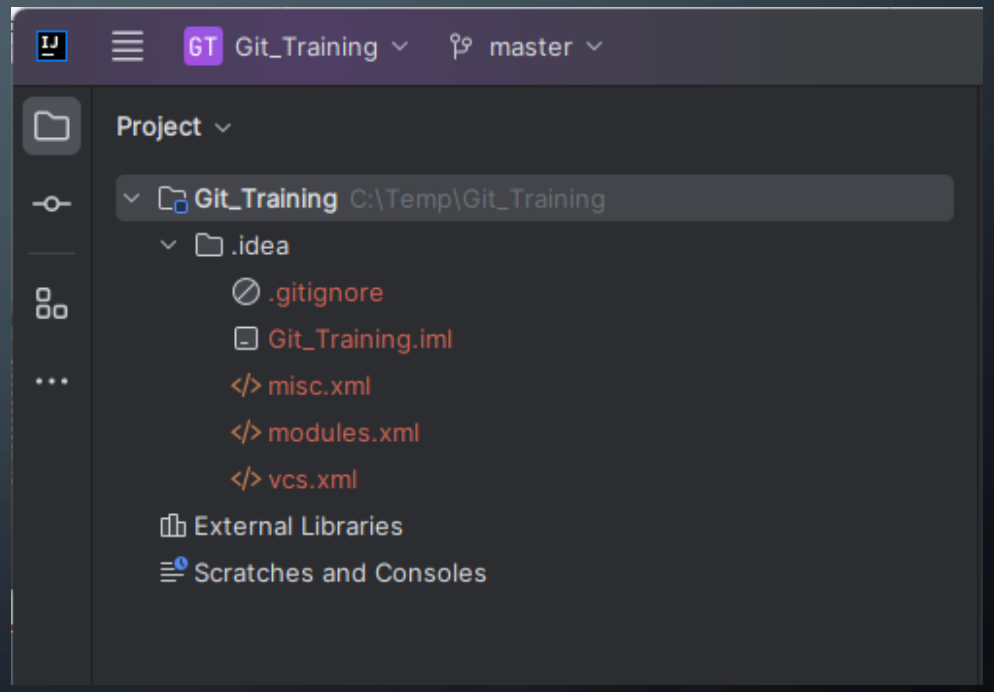


EXCERCISE: CREATE A NEW LOCAL REPOSITORY

COMMAND PROMPT

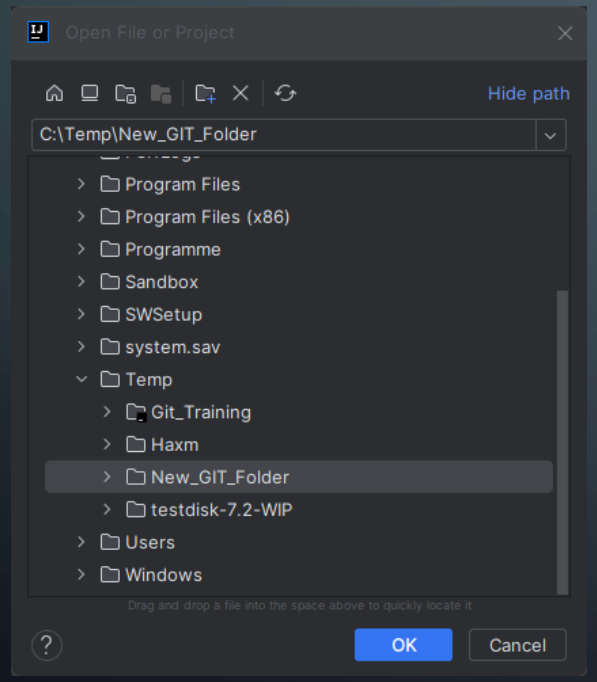
```
GIT Training > dir /AH
 Volume in Laufwerk C: hat keine Bezeichnung.
 Volumeseriennummer: 4E37-3A48

 Verzeichnis von C:\Temp\Git_Training

06.09.2023  00:00    <DIR>          .git
               0 Datei(en),              0 Bytes
               1 Verzeichnis(se), 1.626.402.197.504 Bytes frei

GIT Training > dir .git
 Volume in Laufwerk C: hat keine Bezeichnung.
 Volumeseriennummer: 4E37-3A48

 Verzeichnis von C:\Temp\Git_Training\.git

06.09.2023  00:00    <DIR>          ..
06.09.2023  00:00               130 config
06.09.2023  00:00                73 description
06.09.2023  00:00                23 HEAD
06.09.2023  00:00    <DIR>          hooks
06.09.2023  00:00    <DIR>          info
06.09.2023  00:00    <DIR>          objects
06.09.2023  00:00    <DIR>          refs
               3 Datei(en),            226 Bytes
               5 Verzeichnis(se), 1.626.402.078.720 Bytes frei
```

INTELLIJ



EXCERCISE: CREATE A NEW LOCAL REPOSITORY

INTELLIJ



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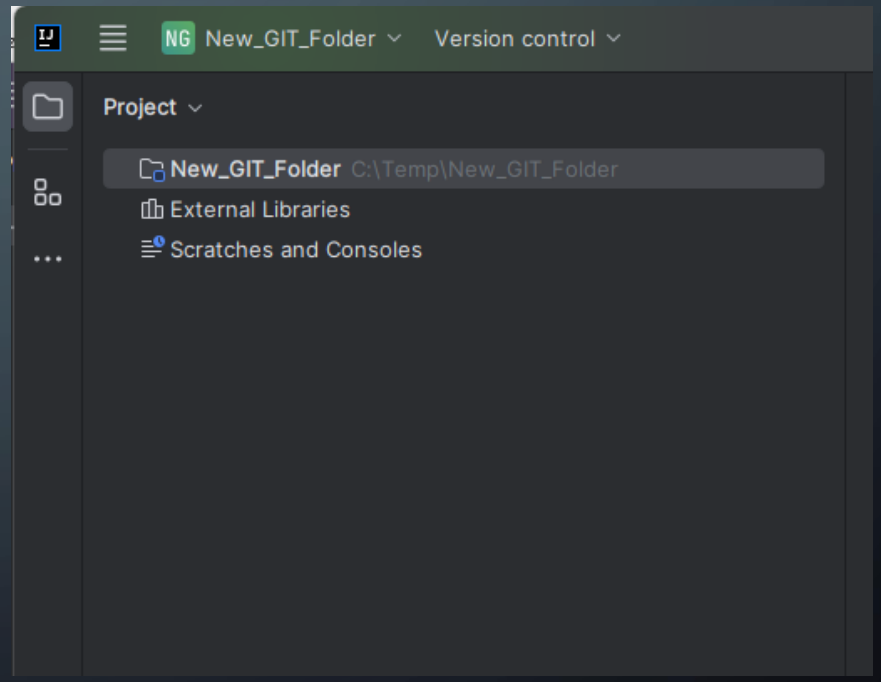
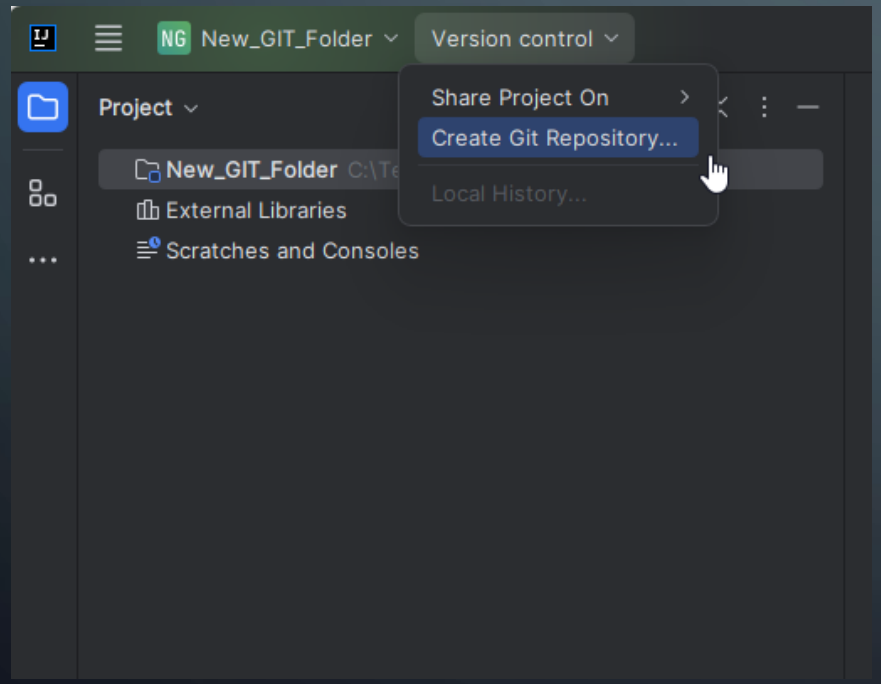
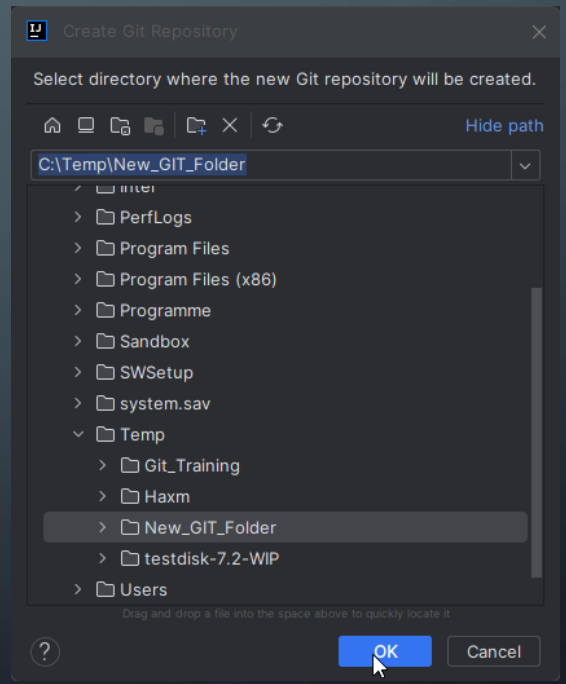


EXCERCISE: CREATE A NEW LOCAL REPOSITORY

INTELLIJ

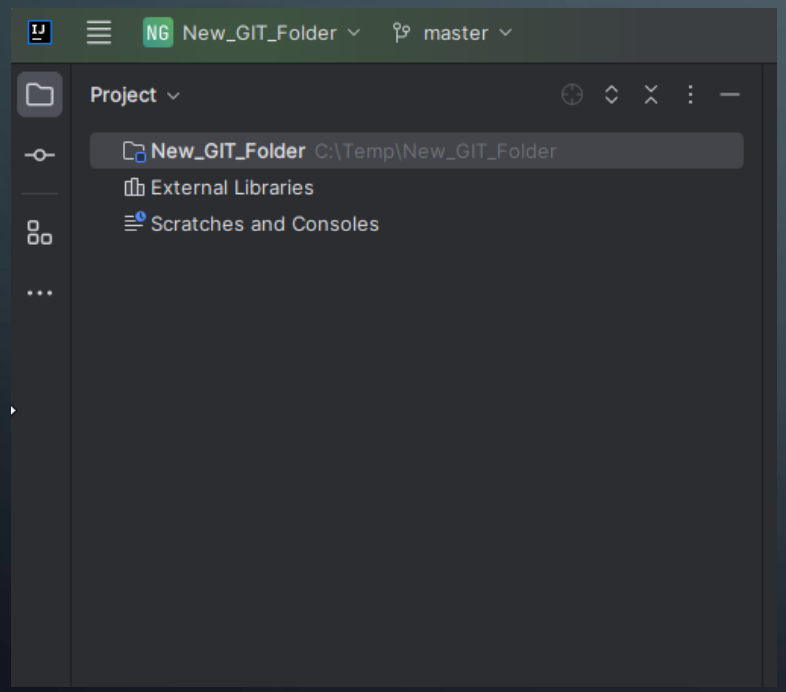


INTELLIJ



EXCERCISE: CREATE A NEW LOCAL REPOSITORY

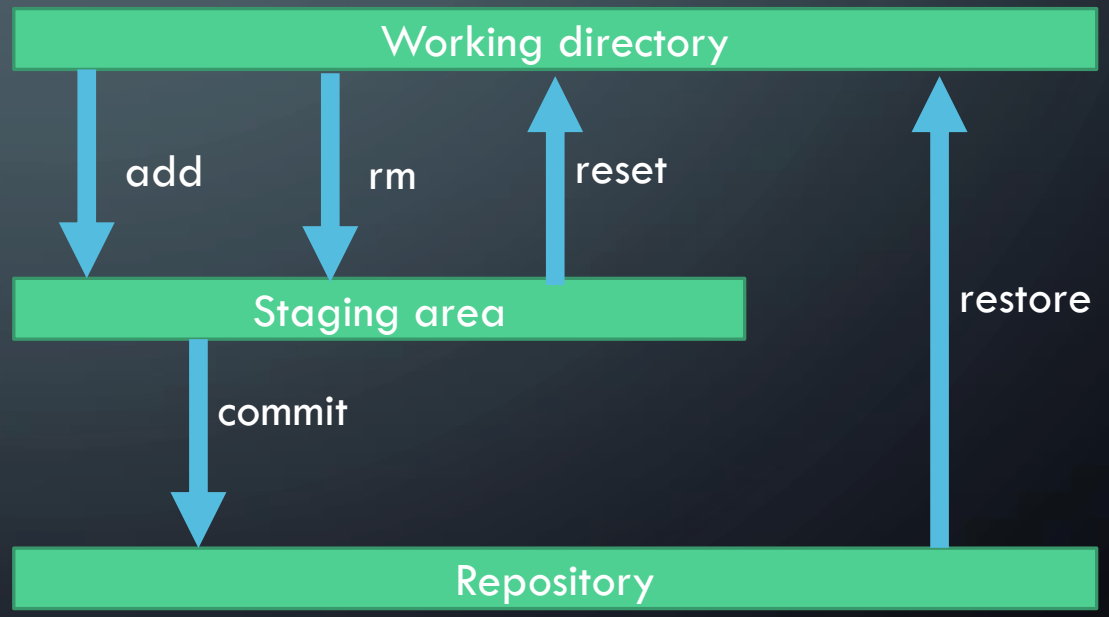
INTELLIJ



ADDING FILES / DIRECTORIES TO A REPOSITORY

- Adding files / directories to a repository is a 2 phase process:

1. Adding to a staging area
2. Committing to the repository



ADDING FILES / DIRECTORIES TO A REPOSITORY

- Here are the command you'll need in that context:

Command	Explanation
git status	Shows changes since last commit and the content of the staging area
git add <<file/dir . --all>>	Adds to the staging area if content is newer than last commit
git commit –m "Commit comment"	Adds files from staging into the repository
git reset HEAD <<file/dir name>>	Remove file/dir from staging
git rm <<file>> | -r <<dir>>	Remove file/dir and add it to staging
git restore <<file/dir>>	Restore file/dir from the repository
git log	Shows the commit history

ADDING FILES / DIRECTORIES TO A REPOSITORY

What	.gitignore	.git/info/exclude
Location	Every directory in the project can have one, but mostly found in the root directory.	Only one file on the above shown location in the project.
Function	Contains the information on what to ignore for /exclude from commits as of the directory it is in.	Contains the information on what to ingnore for / exclude from commits for the project.
Format	• # Start a comment line • * Stands for any character but a slash • / Separates directories • <<file/dir>> Matches the file or dir, absolute or relative • **/ Matches any directory + subdirectories • /** Matches all files and sub-dirs in a dir • [a-zA-Z0-9] Matches a range(s) of characters	

ADDING FILES / DIRECTORIES TO A REPOSITORY

Pattern in .gitignore	Explanation
node_modules	Ignore the node_modules dir (or file)
node_modules/	Ignore the content of the dir, but not the dir itself
# All bin files	Comment, has no consequence
/*/temp	Ignore the temp dir in each of the subdirs of the dir the .gitignore is in (1 level)
/**/readme	Ignore the file readme in any of the subdirs of the dir the .gitignore file is in
d/**/k	Matches d/k, d/x/k, d/x/y/k, and so on

EXERCISE: ADDING TO THE REPOSITORY

(TRY TO DO THE EXERCISE ON THE COMMAND LINE AND, IF POSSIBLE, IN INTELLIJ)

- Goto an empty directory, where you created a new GIT repositor and which you already opened as a project in IntelliJ.
- Look at the GIT status
- You should see an .idea directory, which is not comitted yet
- Add the directory to staging
- Look at the GIT status
- Remove the directory and its files from staging again
- Look at the GIT status

EXERCISE: ADDING TO THE REPOSITORY

(TRY TO DO THE EXERCISE ON THE COMMAND LINE AND, IF POSSIBLE, IN INTELLIJ)

- Make sure that the .idea directory is never considered for staging again
- Look at the GIT status
- Use IntelliJ to create file1.txt with this content:
  This is the first file I am going to check in
- Save the file
- Look at the GIT status
- Add the file to staging
- Look at the GIT status

EXERCISE: ADDING TO THE REPOSITORY

(TRY TO DO THE EXERCISE ON THE COMMAND LINE AND, IF POSSIBLE, IN INTELLIJ)

- Commit to the repository
- Look at the GIT status
- Add a second line to file1.txt and save it:

  Here is a modification
- Look at the GIT status
- Add all modified files to staging and commit them to the repository
- Look at the GIT status

EXERCISE: ADDING TO THE REPOSITORY

(TRY TO DO THE EXERCISE ON THE COMMAND LINE AND, IF POSSIBLE, IN INTELLIJ)

- Use the OS GUI to delete file1.txt from the directory
- Look at the GIT status
- Get the latest version of the file from the repository
- Look at the GIT status
- Have a look at the commit history