Version Control

- FELIX VAKS, ACTUARY
- OFFICE OF THE CHIEF ACTUARY
- SOCIAL SECURITY ADMINISTRATION

Disclaimer

• The views presented here are mine and do not represent the Social Security Administration or the Office of the Chief Actuary within SSA.



Outline

- Benefits of Version Control
- Different Types of Version Control
- Git
- Sourcetree

Version Control

Practice of tracking and managing changes to software code

Traditional Version Control

- You probably use version control already
- Documents, Spreadsheets, Presentations, Programs
- Annual Projects/Reports/Scenarios
- "Save As.."
- Subfolders (2011/2013/2016)
- Document.ver1.doc
- FinalBudgetVersion_ALT2_NewAssum_2ndDemo.xlsx

Version Control Software (VCS)

A system that records changes to a file or a set of files over time so that you can recall a specific version later.

Keep Track Of:

- Who made the change
- When it was made
- What was the change
- Why it was made

Benefits of Version Control Software

- Revert selected files back to a previous state
- Revert the entire project back to a previous state
- Compare changes over time
- See who last modified something
- Easy recovery from lost or modified files
- Determine why you changed something

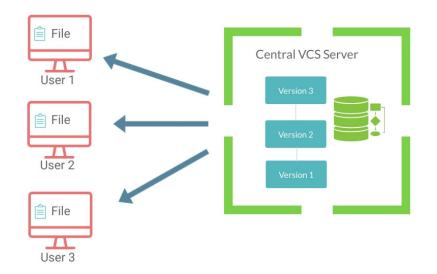
1st Generation VCS – Local Version Control

Dates back to 70s Very basic saving of code Single Computer Local Computer

What if database needs to be used by several users?

2nd Generation VCS – Central Version Control

- Single Server that contains all the history.
- Each developer can "check out" files from this central server.
- Collaborate with developers on multiple computers.



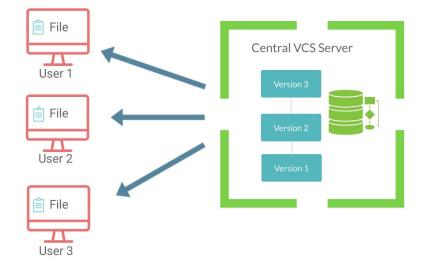
2nd Generation VCS – Central Version Control

Examples: CVS, SVN, PTC Integrity (MKS)

Advantage: All users are in sync with all other computers

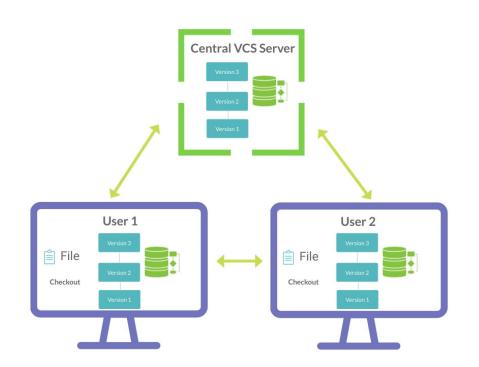
Disadvantage:

- Single point of failure
- Only one user can work on a specific file



3rd Generation VCS – Distributed Version Control

- Modern version control systems that are widely used today
- Instead of just checking out the latest versions of the files; you will be fully mirroring the central server including its full history.
- Its like having you own server locally, working in collaboration and in sync with other servers including the central server.



3rd Generation VCS – Distributed Version Control

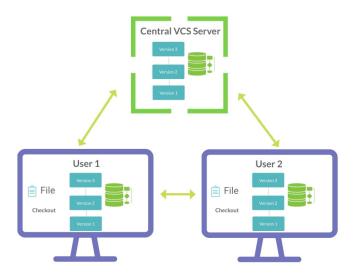
Examples: Git, Mercurial, etc.

Advantages:

- No need of active dependency with central server
- Easy backup (each computer is a backup)
- Easy branching and merging of code
- Allows multiple users to work on same file

Disadvantage:

 Does not work well with binary files (non-text files such as Word, Excel, PDF...)



Git LFS (Large Files Storage)

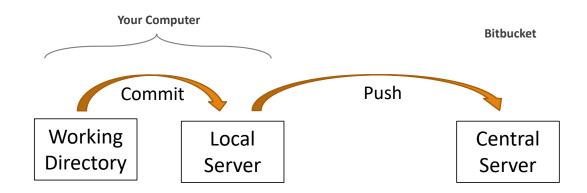
- Extension to Git for versioning large files
- Works exactly the same way as Git
- Replaces the large files in local history as tiny pointer files
- They point to a separate LFS server
- Git handles both LFS and non-LFS files smoothly

Advantages:

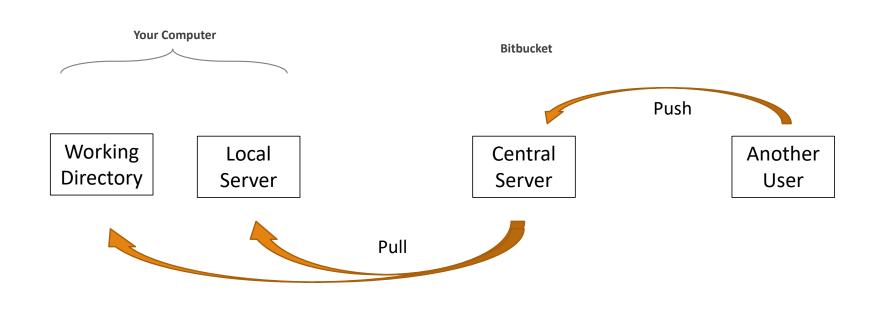
- Has all the features of git
- Can lock files to avoid merge conflicts



Git Workflow - Saving Changes



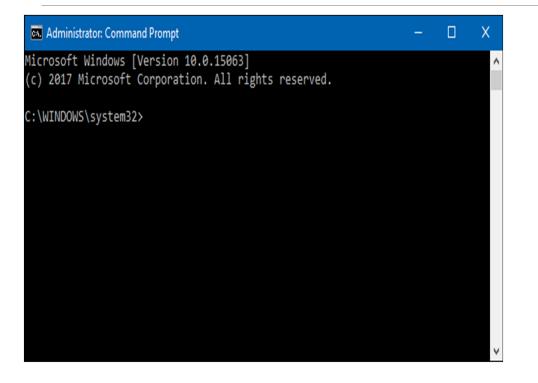
Git Workflow - Update Local Computer



Viewing Git on Central Server

III III Bitbucket Your work	Projects Repositories 🗸 People 🗸		Q Search for code, commits or reposit	tories 🕐 🖪 🕒
Office of the Actuary GitTools	Office of the Actuary / GitTools Tools to be used in Git (such as Sourcetree external diff and custo	om actions)		O Watch
ACTIONS [1] Clone [3] Create branch	Source & master v ··· GitTools /			Browse Filter
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Reports NEW	MKStoGIT			
NAVIGATION	🗅 .gitattributes 🔒	adding attributes from LFS files and git ignore for certain .fm files	362 B	13 December 2019 12:15 PM
<> Source	G .gitignore	adding attributes from LFS files and git ignore for certain .fm files	26 B	13 December 2019 12:15 PM
♦ Commits	CheckRepo.bat	Adding ability to check on branches	5.43 KB	20 September 2022 01:27 PM
Graphs	CheckRepo.fulloutput.bat	Fixing for empty spaces in output name as well repo path name	3.68 KB	29 July 2022 02:21 PM
្ងៃ Branches	C commitmessage.hta	If there is nothing in the commit message then give an error message and don't close the HTA window.	2.88 KB	24 November 2020 05:39 PM
ရီ Pull requests	C commitmessage.vbs	MKS checkin - added ability to add a commit message. If cancelled or no message then script is aborted.	287 B	12 December 2019 02:46 AM
-C Forks	C download_commit.bat	Renaming view_project.bat to download_commit.bat to easier keep track of the programs.	845 B	14 May 2020 10:55 AM
🗘 Builds	C download_commit.hta	view_project now references download_commit.hta (a new file which is similar to view_project.hta). Made the output n	more concise. 4.49 KB	13 May 2020 08:58 PM
SHORTCUTS	D_Checkin.bat	Changing the gittools path for the current user	5.99 KB	25 October 2022 02:31 PM
+ Add shortcut	C idstage.vbs	now works with \$Id and without	2.63 KB	30 August 2021 10:27 PM
Repository settings	C lock_check.vbs	Now batch will search for filename and subfolder. VBS will only use the find in string to determine the permission.	1.07 KB	02 September 2021 01:24 PM
CEPOSITORY Settings	C lock_few.bat	.gitattributes .gitignore and .gitlocks can now work properly	5.81 KB	21 July 2022 12:13 PM

Using Git to Save Changes



This may be hard for some people to use.

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TAGS			Addi	- ng ability to	check on brar	nches		20 Sep 2022 13:27	Vaks, Felix <	Felix.Vaks@ssa.gov>	8b5eb54	
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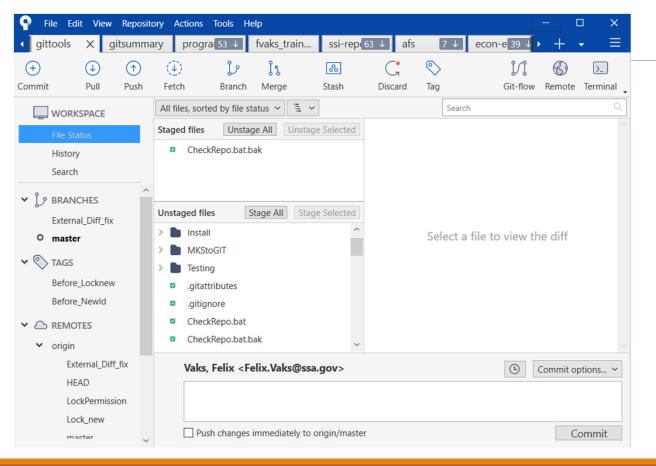
Sourcetree

- Sourcetree is a visual, easy-to-use interface with Git.
- No CMD line required (just point and click)
- Do need to have an understanding of what the git commands do

Benefits of Using Sourcetree

- 1. Process most git commands using point and click
- 2. Easily view history of individual files
- 3. Easily compare history at different points in time
- 4. External Diff to compare individual files
- 5. Blame
- 6. Search within history
- 7. Branch and merge
- 8. Custom Actions

1) Point and Click



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Change E: to LR reference.	6/11/2020	Vaks, Felix	03b0c94		71 72	83 84	·····git·fe	tch	
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] Follow renamed files								Clo	se

2) Individual File History

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3) ComparingHistoryBetweenDifferentTimepoints

4) Using External Diff (WinMerge)

Help	
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s)SitTemp\1_SitCompare.hat	C:\Users\770499\AppData\Local\Temp\GitTemp\2_GitCompare.bat
arg 2 is blank that means that it's a rename or move of file. try to open up two compares "nul" file tCompare.bat) will actually be actived twice. This is a bug in around this bug we are going to copy the two files and change the pare. " then we are going to copy the first file and exit. If arg 1 is ing to copy the second file and try to compare the last two files	REM If filepath for arg 2 is blank that means that it's a rename or move of REM Sourcetree will try to open up two compares REM 1) old file and "nul" REM 2) "nul" and new file REM This program (GitCompare.bat) will actually be actived twice. This is Sourcetree. To work around this bug we are going to copy the two files and reference of the compare. REM If arg 2 is "nul" then we are going to copy the first file and exit. I "nul" then we are going to copy the first file and exit. I "nul" then we are going to copy the second file and try to compare the last created in "AppData\Local\Temp\GitTemp" folder
r doesn't exist then created OFILE%\AppData\Local\Temp\GitTemp (<pre>REM "E:\usr\fvaks\Work\GIT\gittools\message.vbs" %2 %CD% REM If GitTemp folder doesn't exist then created if not exist %USERPROFILE%\AppData\Local\Temp\GitTemp (mkdir %USERPROFILE%\AppData\Local\Temp\GitTemp)</pre>
	<pre>if /I "%~x2"==".doc" goto CompareWord if /I "%~x2"==".docx" goto CompareWord if /I "%~x2"==".docm" goto CompareWord if /I "%~x2"==".dotm" goto CompareWord if /I "%~x2"==".dotm" goto CompareWord</pre>
goto CompareExcel	<pre>if /I "%~x2"==".xls" goto CompareExcel if /I "%~x2"==".xls" goto CompareExcel if /I "%~x2"==".xlsm" goto CompareExcel if /I "%~x2"==".xlsb" goto CompareExcel if /I "%~x2"==".xlsb" goto CompareExcel</pre>
goto CompareFM	<pre>if /1 "%~x2"==".xlt" goto CompareExcel if /I "%~x2"==".klt" goto CompareExcel if /I "%~x2"==".book" goto CompareFM if /I "%~x2"==".pot" goto ComparePDF if /I "%~x2"==".ppt" goto ComparePD if /I "%~x2"==".ppt" goto ComparePD</pre>
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5) Using "Blame"

Quickly view who and when created the code (who is to "blame" for that code)

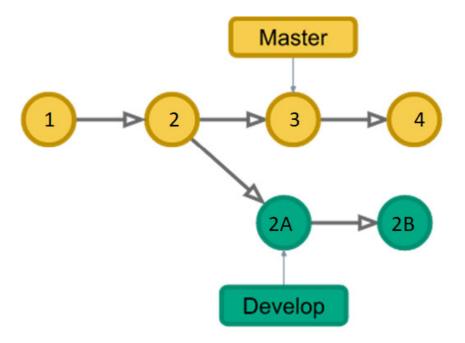
Bl	ame: CheckRe	oo.bat	– 🗆 X							- 🗆
ine	Author	Commit	Content	Description	Date	Author	Commit	^ 💋 Check	Repo bat	\$ ~
7	Vaks, Felix	cce6b877		Adding ability to check on branches	9/20/2022	Vaks, Felix	8b5eb54	12	·+····	
78	Vaks, Felix	5c016ef0		fix to transfer file with space to checkrepo.fullo	7/29/2022	Vaks, Felix	d97db70	73 74	+ · · · · set error=0	ovo1%""0".cot.c
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30	Vaks, Felix	7cb82b15	REM call :showfulloutput %localrepo% %originrepo%	Changing Find command to %SystemRoot%\sy	11/25/2020	Vaks, Felix	7a3a104	76	+ REM echo	
1	Vaks, Felix	7cb82b15		Adding error if path of repo is not correct	8/26/2020	Vaks, Felix	4168211	78	+++++++++++++++++++++++++++++++++++++++	
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9	Vaks, Felix	ee4113c4		Change E: to LR reference.	6/11/2020	Vaks, Felix	03b0c94	77 89	REM echo	error
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4	Vaks, Felix	8c3e3395	If "!error!"=="-1" (EXIT /B !error!)	Committer: Vaks, Felix				181 193	<pre>if "!error!"=="-1"</pre>	
5	Vaks, Felix	41682113	If "!error!"=="-2" (EXIT /B !error!)	Adding error if path of repo is not correct				194 182 195	+ If "!error!"=="-2"	(EXII /B !error!)
	Vaks, Felix	8c3e3395						183 196	···Exit·/B·!changecour	t!
	Vaks, Felix	8c3e3395	Exit /B !changecount!	error for wrong path is -2				184 197		
	Vaks, Felix	8c3e3395		error for no connection to Bitbucket is -1				~	<	
9	Vaks, Felix	ee4113c4	endlocal	Follow renamed files						Cl

6) Search History

Pile E	dit View	Reposit	ory Actions	; Tools He	łp									-	
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File S Histo						r to use Extern hat Sourcetree					2022 20:14 022 13:28	Vaks, Felix <felix.vaks@ c67346b<br="">Vaks, Felix <felix.vaks@ 1de985d<="" td=""><td></td></felix.vaks@></felix.vaks@>			
Searc			Adding Dif	f tool of Com	paring PDF					28 Jun 2	022 15:20	Vaks, F	elix <felix.< td=""><td>Vaks@</td><td>88e5c01</td></felix.<>	Vaks@	88e5c01
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0	nal_Diff_fix		Now can open and copy selected files. 19 Mar 2020 0:39 Sending the file name to a separate batch file. 16 Mar 2020 0:00								Vaks, Felix <felix.vaks@ b501d1f<br="">Vaks, Felix <felix.vaks@ 4dd3598<="" td=""></felix.vaks@></felix.vaks@>				
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	i.		-	Compare_Wo different files		WordDiff.bat	since they are	not neces	sary. They	5 Jan 202 21 Nov 2	20 22:22 2019 23:45		elix <felix. elix <felix.< td=""><td></td><td>1a4d526 8e1ea6b</td></felix.<></felix. 		1a4d526 8e1ea6b
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➤ origin	ı		Date: Wed	nesday, Augu	ist 26, 2020 3				70 70 71		REM setting th	e error	level if	repo d	irectory doe
E	xternal_Dif	f_fix		r: Vaks, Felix					72	. +	set error=0				,
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		~							81	+					

7) Branching

- Best feature of Git
- Off to the side model
- Different groups can work on same project



Basic Branch and Merge

Graph	Description	Date	Author	Commit
•	Replacing regular Custom Actions script paths ir	18 Jul 2022 16:01	Vaks, Felix	96044df
	Program to replace path for custom actions fron	18 Jul 2022 12:34	Vaks, Felix	8e5490a
	Merge branch 'Spaces_Fix'	28 Jun 2022 15:22	Vaks, Felix	4dcfaaa
	Adding Diff tool of Comparing PDF	28 Jun 2022 15:20	Vaks, Felix	88e5c01
+	origin/Spaces_Fix Fixing bug where if the f	27 Jun 2022 21:48	Vaks, Felix	6e26a9f
•	Working with spaces in file name and file path.	16 Jun 2022 13:20	Vaks, Felix	c07b4e6
	Converting Econ EcoDev MKS project to Git. Ver	13 Jun 2022 11:47	Vaks, Felix	a81e1af
	Program to add list of branches to current repo.	13 Jun 2022 9:35	Vaks, Felix	74de9be
	Making the format neater. Now it splits into nar	16 May 2022 23:36	Vaks, Felix	e040c8f
	Changing link from C: to LRSERV1	13 May 2022 15:31	Vaks, Felix	99f098b
	It now lists the locked files in a hta window. Mu	10 May 2022 13:54	Vaks, Felix	b78931b
	Creating a custom action that opens up the rem	5 May 2022 14:12	Vaks, Felix	fcad959
	Undation documentation			···fcበ7116······

8) Custom Actions

Can add helpful tools that are not found in Sourcetree

- Lock files
- See which files are locked
- Download files from history
- View all the files from a certain point in time

Summary

- Benefits of Version Control
- Different Types of Version Control
- Git
- Sourcetree



Use version control to travel further (Hike the Mountains)

Resources

<u>Version Control</u> - https://www.atlassian.com/git/tutorials/what-is-version-control

Git - https://git-scm.com

<u>Sourcetree</u> - https://www.sourcetreeapp.com/

Questions?

