



ECEN 4013
Design of Engineering Systems

Agenda

Gantt Charts
GitHub
Semiconductors



Gantt Charts

- One of the most popular ways to display project tasks vs. Time
- Been around since 1890 – Karol Adamiecki
- Adapted in 1905 by Henry Gantt
- Tasks are represented by a bar that spans the amount of time the task will take
- The project timeline is displayed at the top of the chart
- Can be used as a detailed list of all tasks and dependencies. We will use it as an overview to keep track of dependencies and deliverable dates.
- Icescrum will track your day-to-day tasks and is meant to be less rigid than the Gantt chart

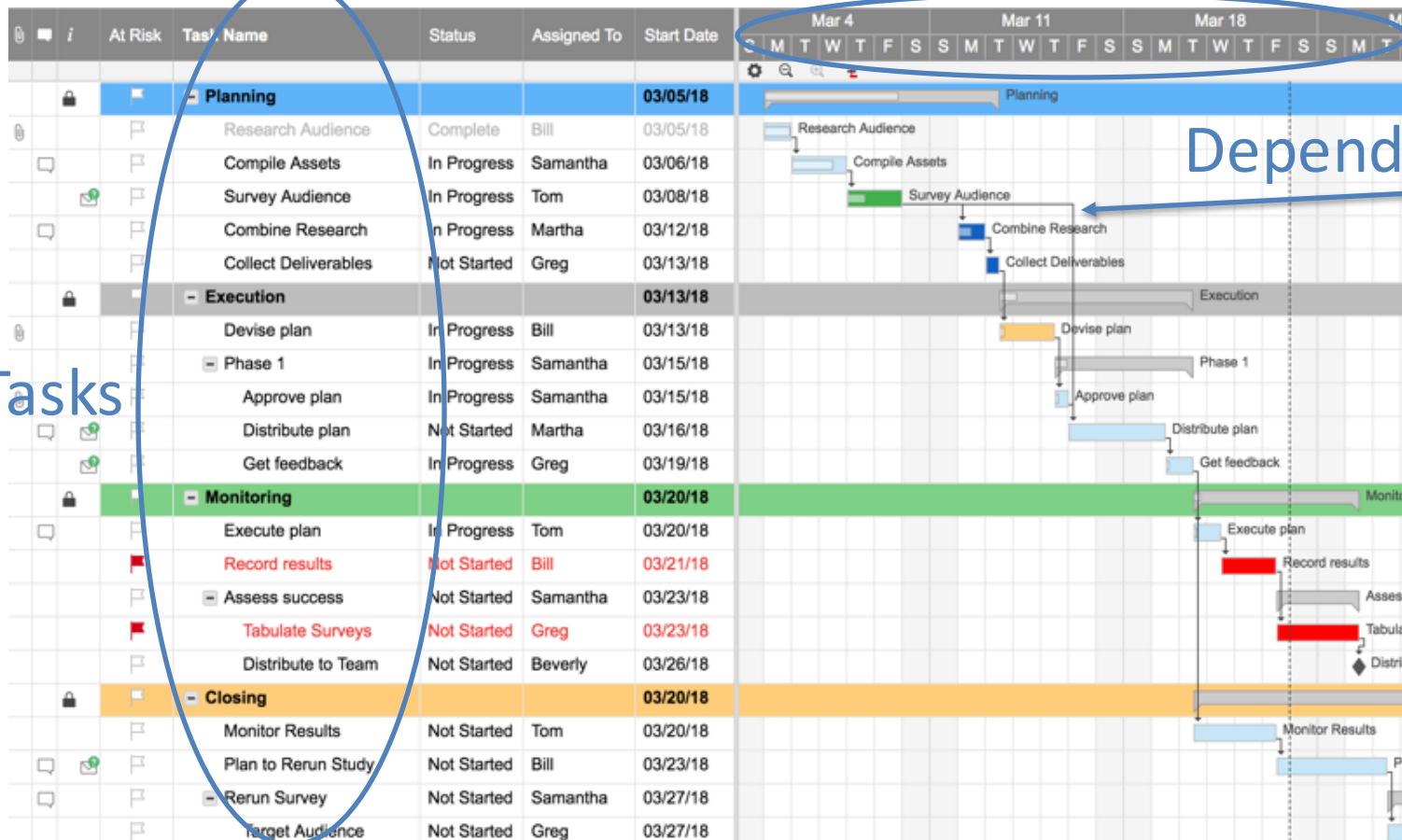
Gantt Charts

Project management tool meant to illustrate an overarching project plan with an emphasis on dependencies.

Dates

Dependencies

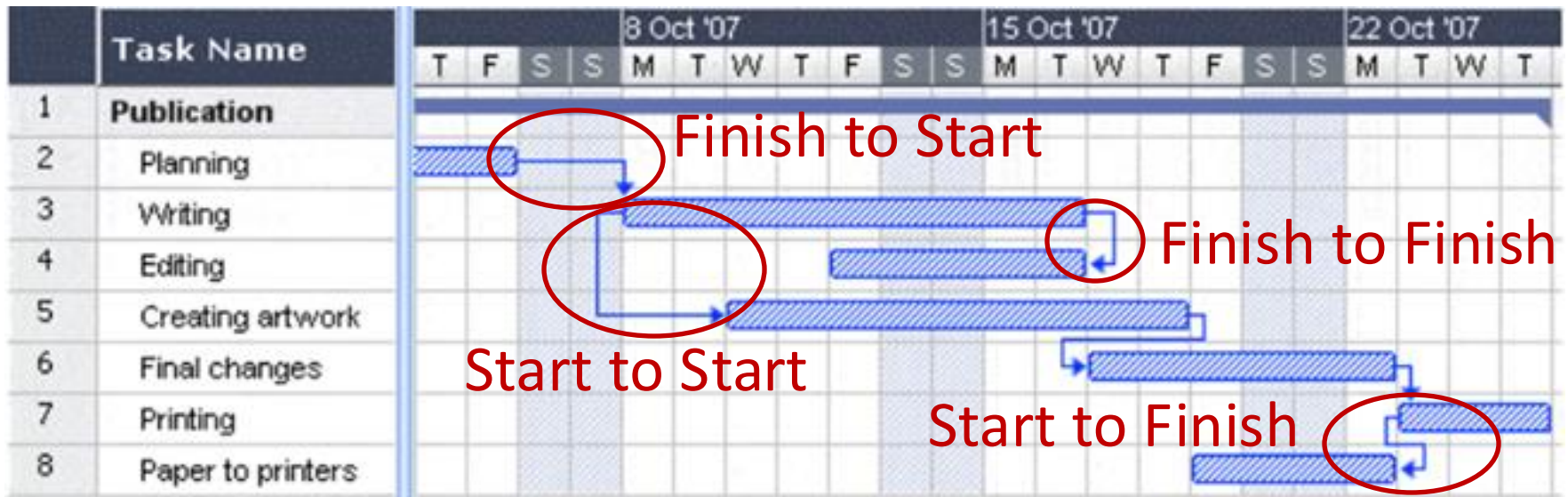
Tasks



Gantt Charts

There are 4 types of dependencies in Gantt charts:

- 1) **Finish to Start** - Cannot start the successor activity until its predecessor is finished.
- 2) **Start to Start** - Cannot start the successor activity until its predecessor has started.
- 3) **Start to Finish** - Cannot finish the successor activity until its predecessor has started.
- 4) **Finish to Finish** - Cannot finish the successor activity until its predecessor has finished.



Gantt Charts

There are many options for software to create nice looking Gantt charts

Free Gantt software (Trial Versions, some with permanent free plans):

<https://thedigitalprojectmanager.com/free-gantt-chart-software/>

Fortunately, you get Microsoft Project as a student at OSU:

Students can download Microsoft Project Professional for free at:

https://portal.azure.com/?Microsoft_Azure_Education_correlationId=ec403fca-4e9f-49af-a936-cd22b3c53118#blade/Microsoft_Azure_Education/EducationMenuBlade/software

Register with Microsoft Azure with your okstate.edu account using the banner near the top that says “Are you a student?” Then several more software packages will be added to the list of available products, including MS Project.

There are many good free online videos for MS Project, such as:

https://www.youtube.com/watch?v=A-yPSJGY-_Y

Gantt Charts

File Task Resource Report Project View Help Gantt Chart Format Tell me what you want to do

Clipboard: Cut, Copy, Paste, Format Painter

Font: Calibri, 11, Bold, Italic, Underline, Color, Background Color

Schedule: 0%, 25%, 50%, 75%, 100%, Mark on Track, Respect Links, Inactivate

Tasks: Manually Schedule, Auto Schedule, Inspect, Move, Mode

Timeline: Start Mon 1/24/22, Tue Jan 25, Wed Jan 26, Thu Jan 27, Fri Jan 28, Sat Jan 29, Sun Jan 30, Mon Jan 31

Add tasks with dates to the timeline

	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Resource Names	Add New Column	W	T
1		think about it	3 days	Mon 1/24/22	Wed 1/26/22		Bill			
2		get it done	10 days	Thu 1/27/22	Wed 2/9/22	1	Fred			

Dependencies

Task Summary Milestone Deliverable

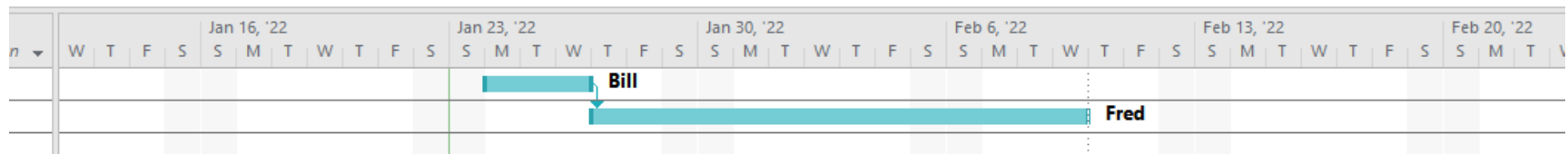
Information: Notes, Details, Add to Timeline

Editing: Find, Clear, Scroll to Task, Fill

Timeline: Jan 31, Tue Feb 1, Wed Feb 2, Thu Feb 3, Fri Feb 4, Sat Feb 5, Sun Feb 6, Mon Feb 7, Tue Feb 8, Wed Feb 9

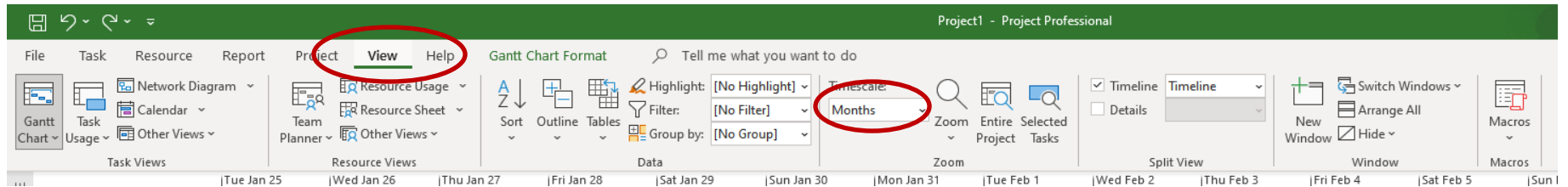
Add tasks with dates to the timeline

Finish Wed 2/9/22

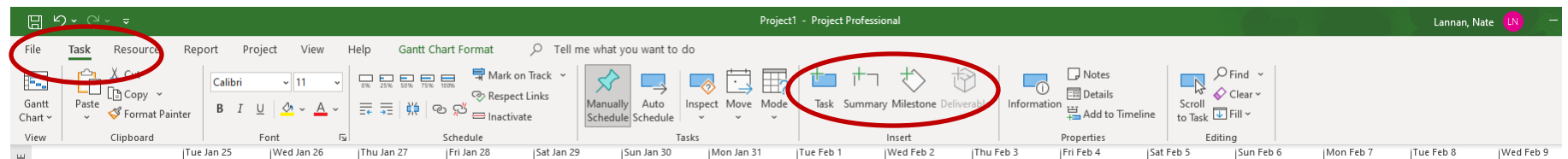


Gantt Charts

To scale your Chart to fit on slides and reports:



To add milestones and deliverables:



Software Repositories

What is a repository (repo)?

- Centralized hubs that help developers create, maintain, and track software

What makes a repo different from cloud storage?

- Version Control
- Package and deployment management
- Release management

Software Repositories

Version Control

- Tracks when files are changed by multiple users and what those changes are
- Allows changes that do not conflict with each other to be merged to the master simultaneously
- When conflicts do arise, they must be mitigated before the code can be merged
- Allows for many people who may not be in direct communication to work on a single project
- Allows for the possibility to revert to old working code if something breaks
- Can this process be used for other files other than code?

Software Repositories

The use of github is not a requirement for project 1. However you may want to consider it to store files (documentation, reports, simulation files). Github will be required on project 2.

Github

The current leader for git implemented repos and a HUGE source for everything from wikis to opensource software. Other options include:

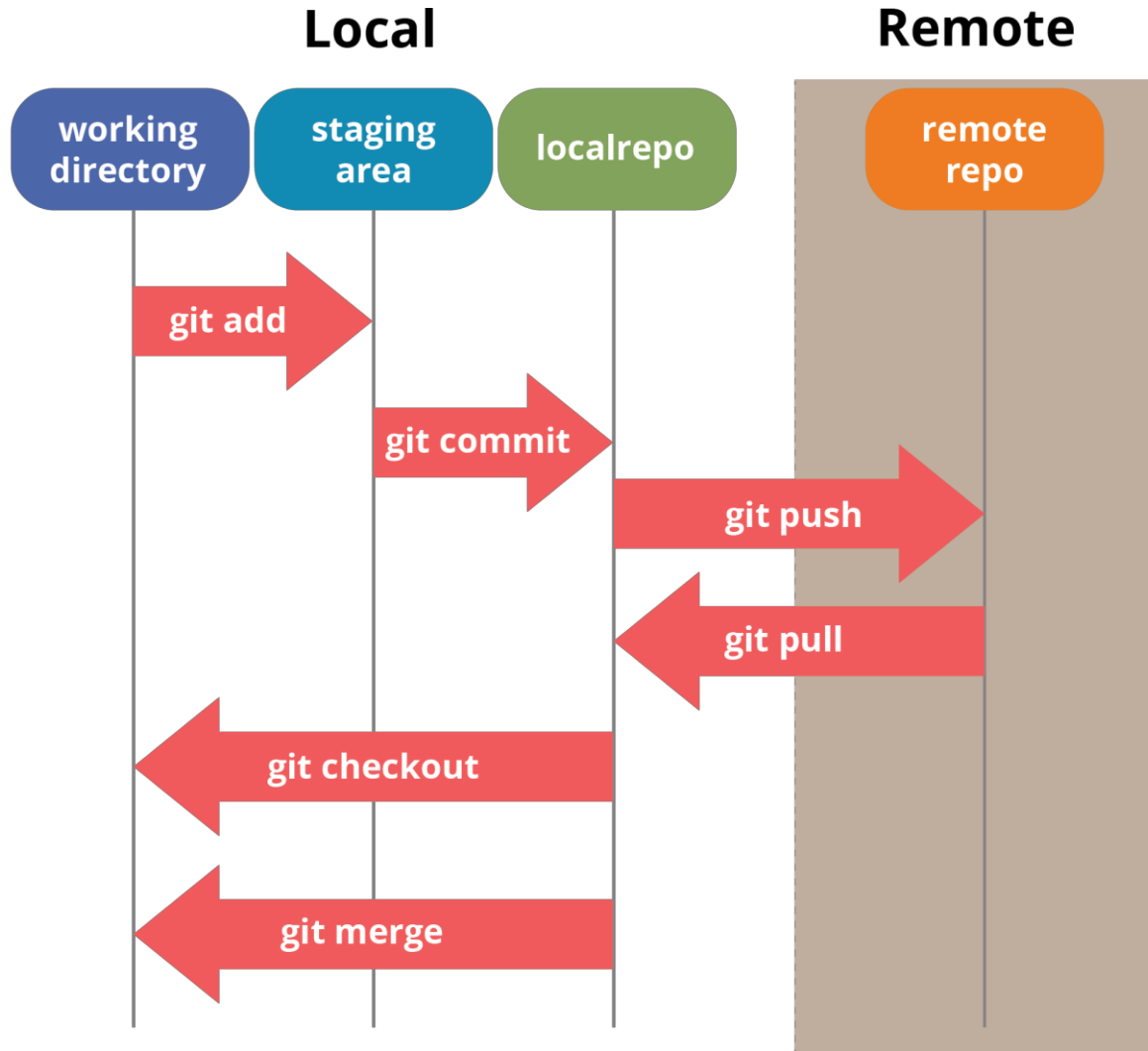
- Bitbucket
- TaraVault
- Gitlab
- Gogs
- Beanstalk

Git

Underlying version control system (VCS) behind github. Alternatives include:

- SVN
- Perforce
- CVS
- Mercurial

Git



Git

Installation

Linux

- Sudo apt install git-all

Mac

- Install homebrew here: <https://brew.sh/>
- From terminal: brew install git

Windows

- Git for windows: <https://git-scm.com/download/win>

GUI

- <https://desktop.github.com/>

Git

SSH Keys – Secure shell protocol (SSH) using public key infrastructure (PKI). Allows login to GIT without sending your username and password over the internet.

To set up SSH keys (All platforms)

<https://docs.github.com/en/enterprise-server@3.0/github/authenticating-to-github/connecting-to-github-with-ssh/generating-a-new-ssh-key-and-adding-it-to-the-ssh-agent>

If you use the Github desktop GUI, this is not necessary.

Git

Typical Workflow (command line)

1. Clone or pull
 - `git clone`
 - `git pull`
2. Make your changes
3. Add files you need to staging area
 - `git add *`
4. Commit locally
 - `git commit -m 'some message about your commit'`
5. Push to github
 - `git push`

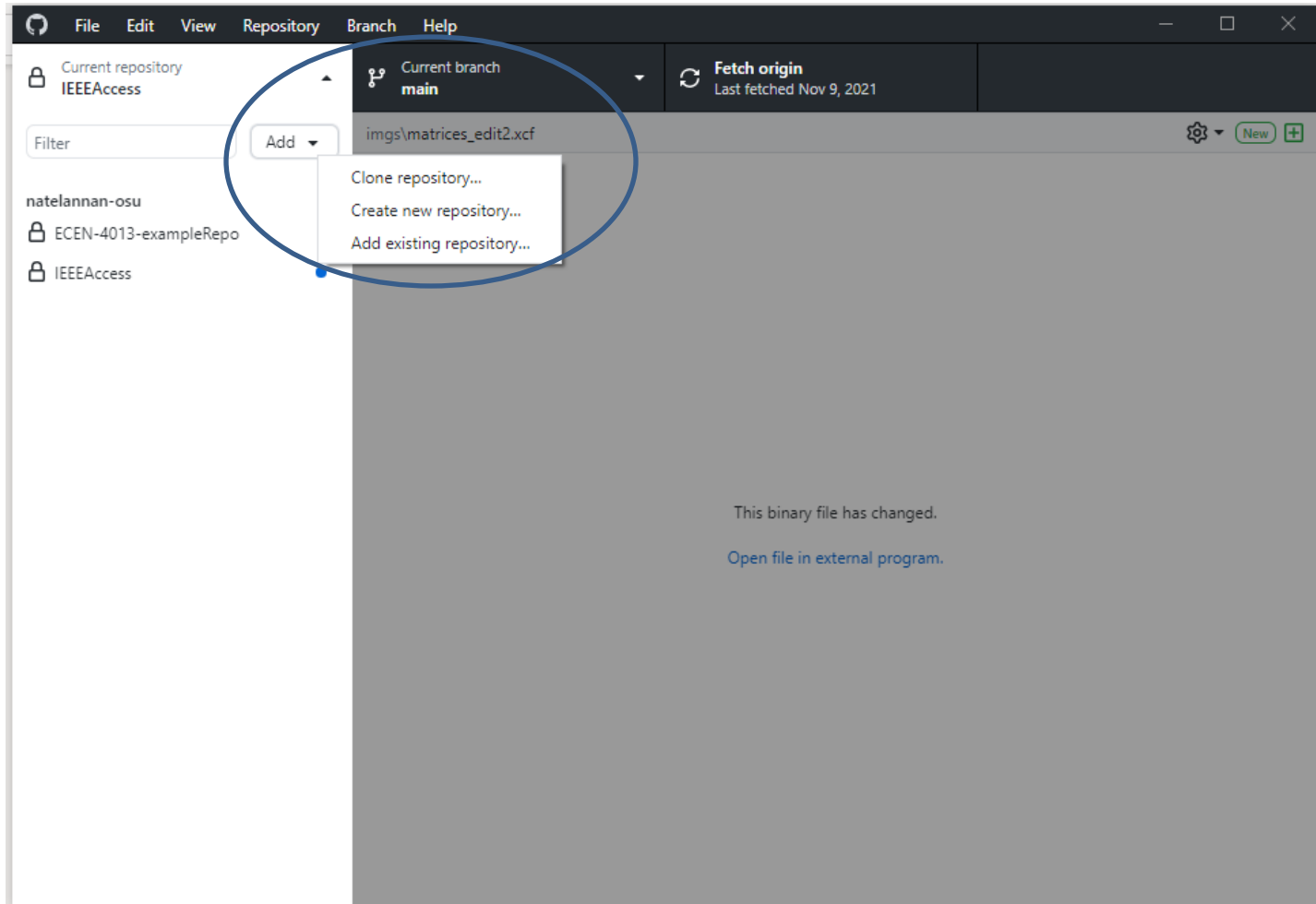
Git

Typical Workflow (GUI)

1. Clone
2. Make your changes
3. Commit locally
4. Push to github

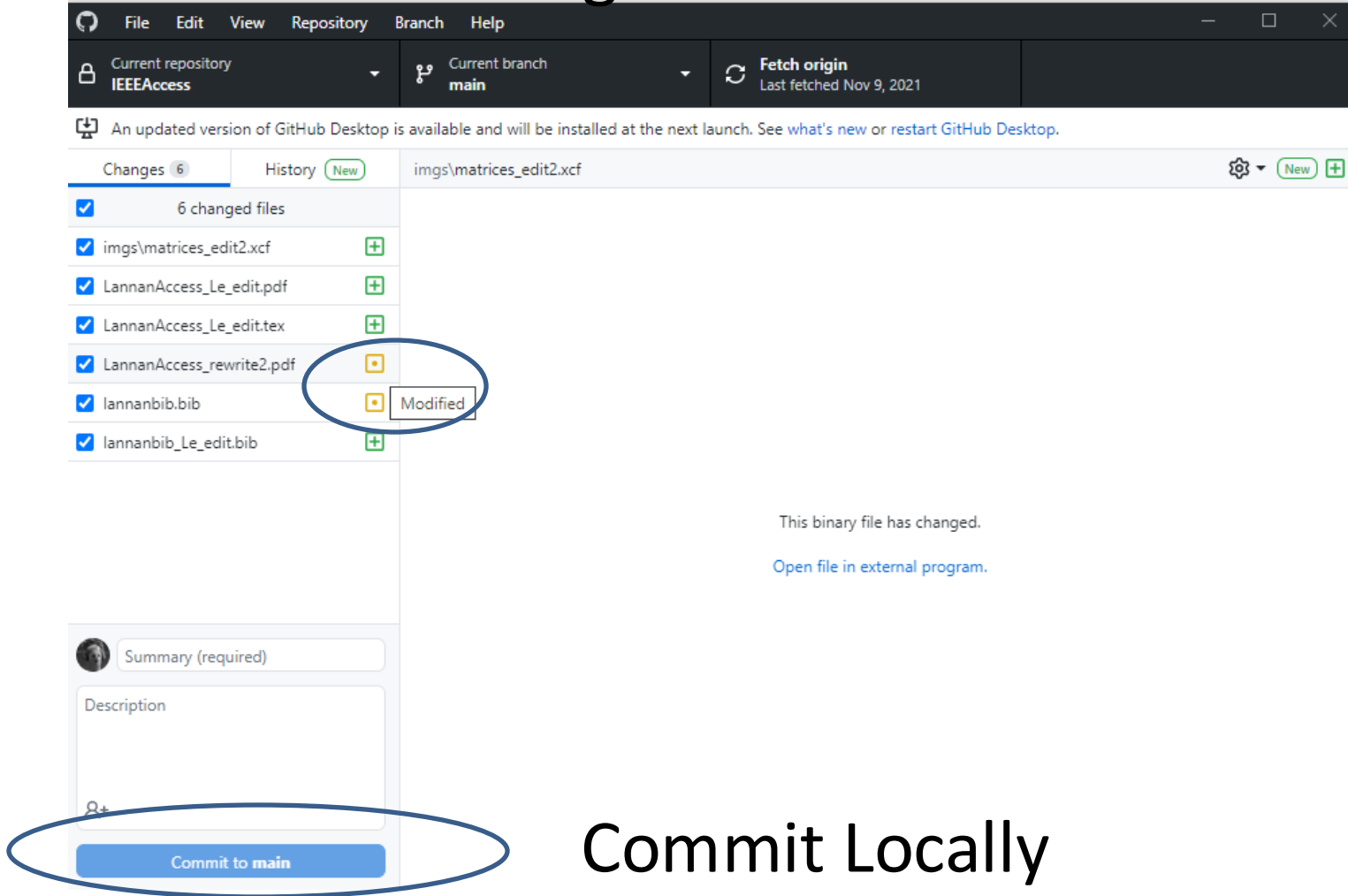
Git GUI

Clone

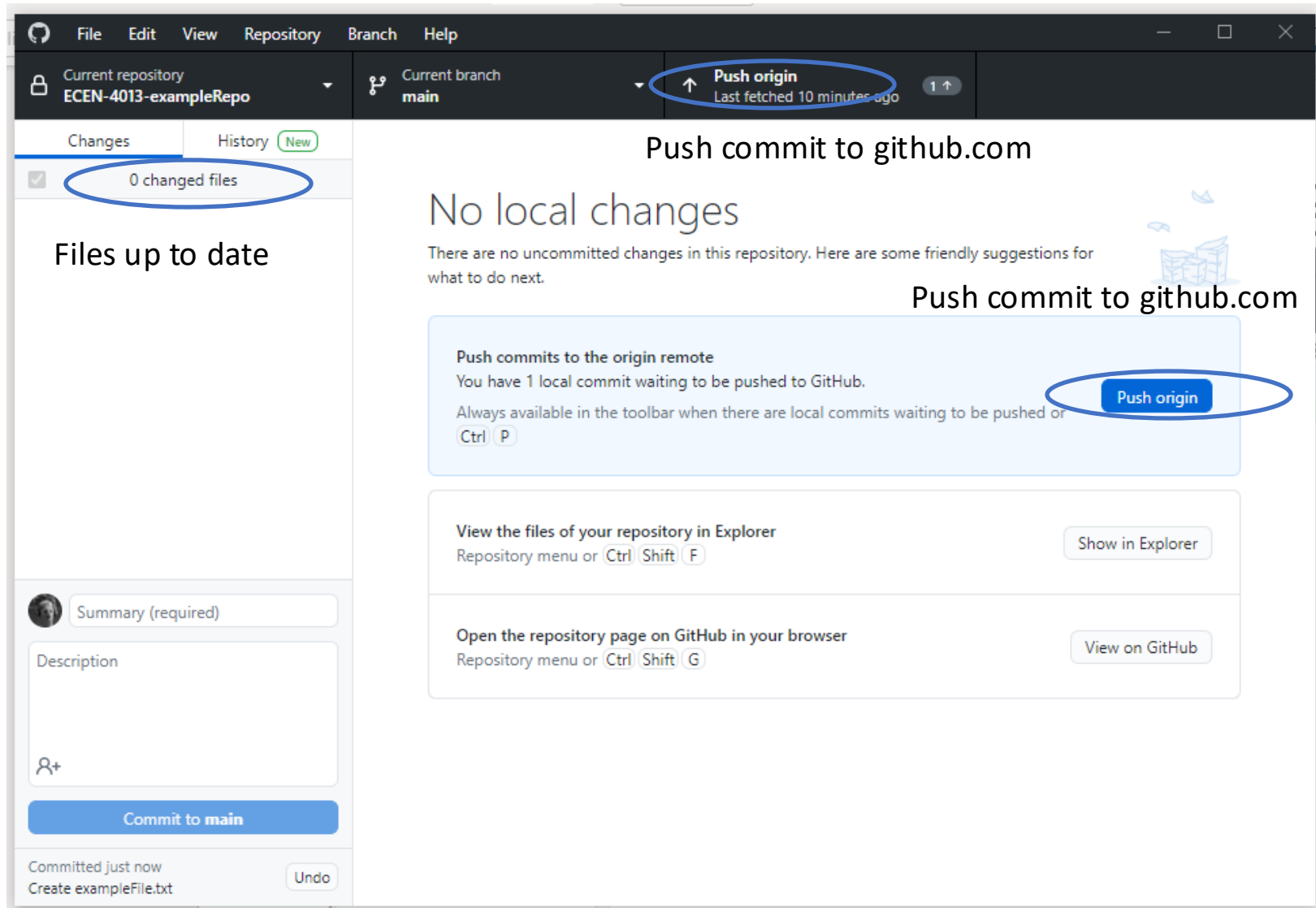


Git GUI

Make Your Changes



Github GUI



Manufacturer part numbers

Semiconductors

Manufacturer part numbers

Circuit designers typically use standard catalog parts from a variety of manufacturers in their designs.

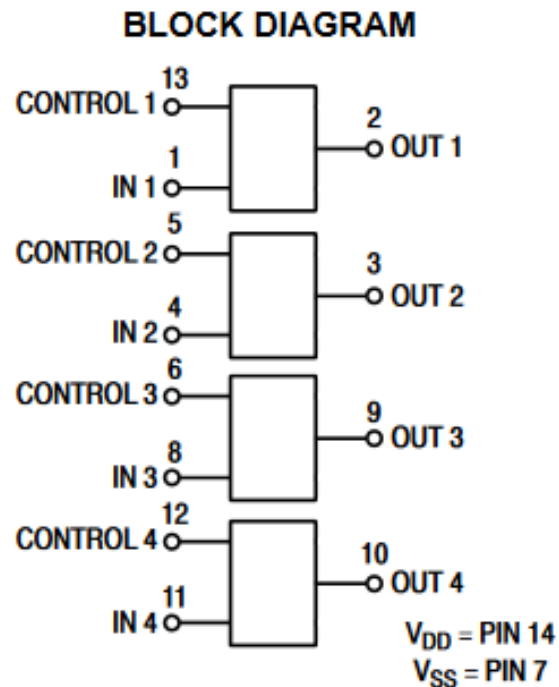
Semiconductor devices usually have a base, or core, part number. These are used with different prefixes and suffixes to identify the manufacturer, performance grade, guaranteed operating temperature range, and package size.

Manufacturer part numbers

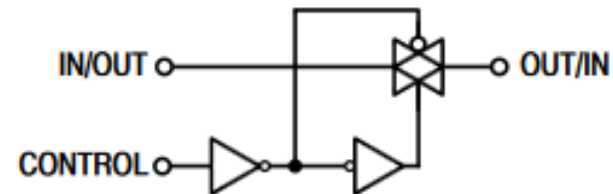
Let's consider the type 4066 quad switch as an example. The 4066 contains four independent analog switches implemented in CMOS technology.

Manufacturer part numbers

The type 4066 quad analog switch:



LOGIC DIAGRAM AND TRUTH TABLE
(1/4 OF DEVICE SHOWN)

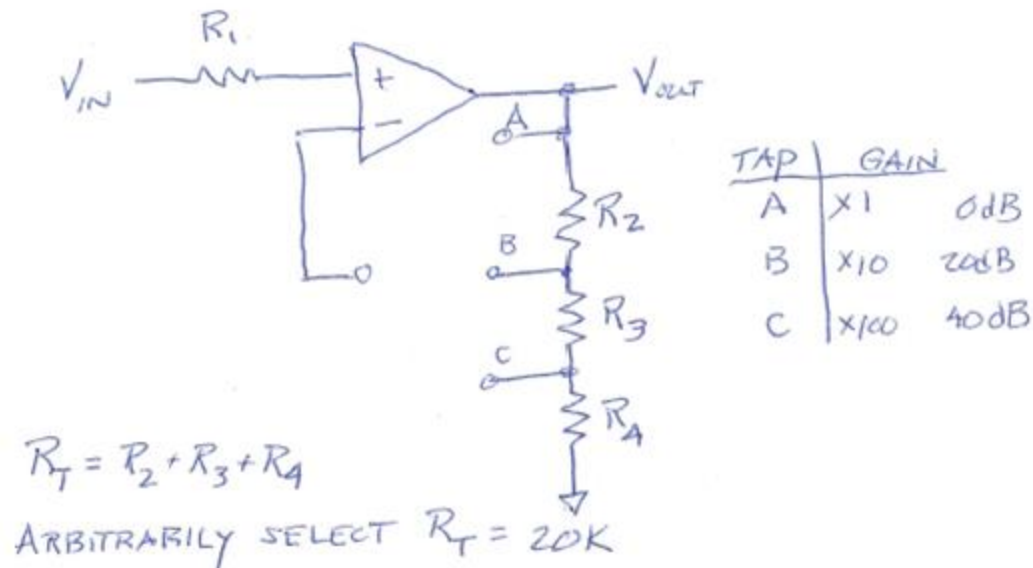


Control	Switch
0 = V_{SS}	OFF
1 = V_{DD}	ON

Logic Diagram Restrictions
 $V_{SS} \leq V_{in} \leq V_{DD}$
 $V_{SS} \leq V_{out} \leq V_{DD}$

Manufacturer part numbers

Where would you use a quad analog switch?



Selectable gain on a non-inverting op amp

Manufacturer part numbers

This logic family was originally developed by RCA, who called it 4000-series logic.

The RCA prefix was CD: hence, the CD4066. Process improvements provided improved output drive, which became the “B” series (buffered).

Manufacturer part numbers

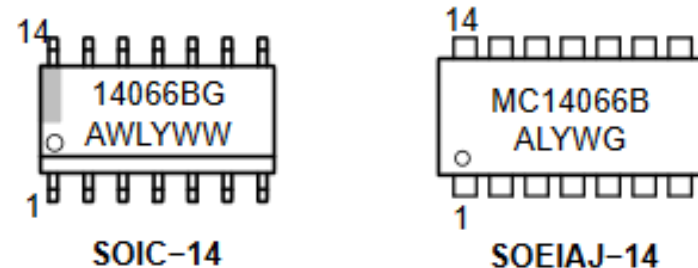
The 4066 quad switch originally was available in a variety of packages (ceramic or plastic DIP). The package options were indicated as suffixes in the part number.

Manufacturer part numbers

Other manufacturers made compatible parts, each with their own prefix and suffixes. A compatible (essentially identical) 4066 device in a plastic DIP from Motorola (now ON Semiconductor) had the part number MC14066BCP.

Typical package options (relatively few, actually)

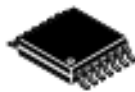
MARKING DIAGRAMS



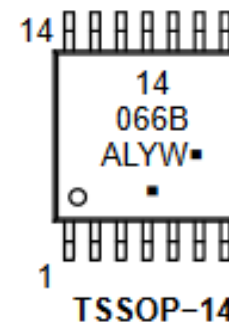
SOIC-14
D SUFFIX
CASE 751A



SOEIAJ-14
F SUFFIX
CASE 965



TSSOP-14
DT SUFFIX
CASE 948G



A = Assembly Location
WL, L = Wafer Lot
YY, Y = Year
WW, W = Work Week
G or ■ = Pb-Free Package

(Note: Microdot may be in either location)

Manufacturer part numbers

Designers will know these base numbers when they select the device family. After a little experience, designers readily recognize the meaning of the prefixes and suffixes.

For example, a 555 timer/multivibrator chip comes in many forms. One such device made by Texas Instruments is TLC555CP. This is a low-power CMOS 555 timer/multivibrator in a plastic 8-pin DIP.

Manufacturer part numbers

The simulation and layout libraries may not find the specific manufacturer's device you intend to use.

When that happens, try to search by the core part number or select a similar device with different core part number.

Manufacturer part numbers

This may seem a lot of unnecessary clutter for circuit simulation. Maybe so.

Package data in the part number often doesn't mean much in simulation, but it is a **huge** consideration for circuit board layout. That's why layout packages have so many different device variations in the parts library.

Manufacturer part numbers

Engineers are responsible for creating manufacturable designs, and this requires a great many details. Part specification details are dull and boring, yes, but tremendously important.

You can have a major manufacturing problem on your hands if there is an error or oversight on even one part number.

Engineers are responsible for the details.

Questions?