INTRODUCTION TO PROJECT MANAGEMENT

DR. RICCARDO LONGO 08/22/2023 PHYS 523 - FALL 2023 LECTURE I





- Introduction to Project Management: why we do it how we do it
- Tasks, depedencies, milestones
- How to setup a project in Microsoft Project from scratch
- How to setup our PHYS523 project in Microsoft Project
- Projects in the real world: risk analysis
- Budgeting a project: cost estimates, contingencies, schedule loading

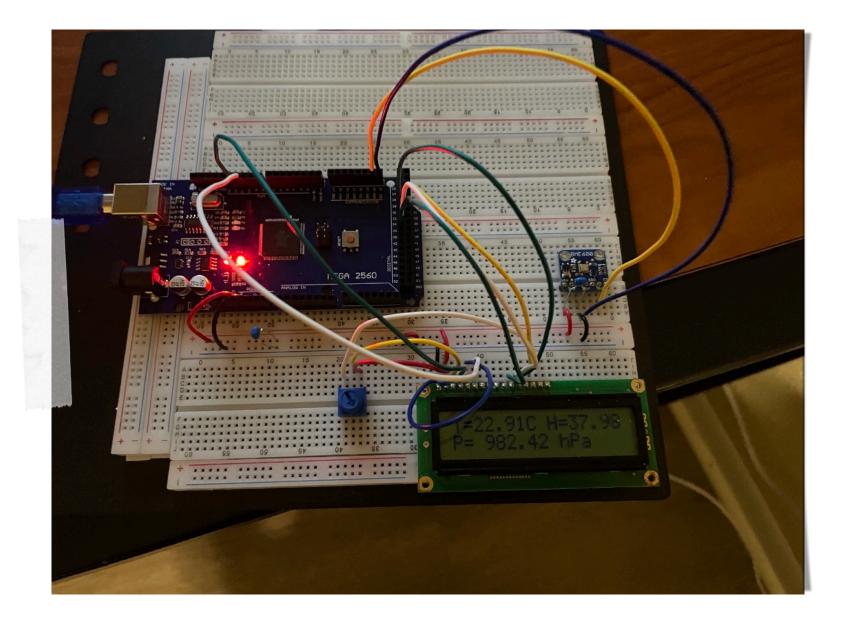


Let's start from the most general concept: what is a project? A project is a set of activities and tasks defined to lead to a specific goal that is not part of the routine

Example: I want to re-paint the fence of my garden. I need to buy the brushes and the paint. I need to have full access to the fence. I need to have a way to restrict access to the area when the paint will be applied. I need help from someone (family, or friends) etc etc.

Example II: I want to build a small PCB where I use a microcontroller to control a BME680 to readout pressure, temperature, humidity, and gas in this room. I need to find a suitable microcontroller. I need to procure both the microcontroller and the BME680. Maybe I also need an external LCD screen where I can visualize in real-time the readout. I need to test the whole circuitry before designing a PCB. I need to design the PCB (am I able to? Shall learn? Or shall I ask someone who knows how to do it for me?), order the PCB, solder the parts on it, design and print a case for it, test that it behaves as expected, calibrate the sensor.... Etc







WHAT ARE THE CORE COMPONENTS OF A PROJECT?

A project can be dissected into a series of specific actions/endeavors - that from now we will commonly refer to as **Tasks.** Task can have different statuses, depending on the stage of the project (not yet started, X% completed, or completed)

A project doesn't always progress on a straight line, tasks can be developed in parallel and by more than one person. Some task must be accomplished to enable others to start. This naturally introduces the concept of **Dependencies**

It is usually convenient to group tasks and dependencies in a project that belong to a welldefined phase of work - and mark their completion with a **Milestone**. You usually define milestones when you draw the project - setting a target date for them.



Tasks

Examples: acquire all the components to test my circuit on a breadboard, write code to readout the sensors and display data on the LCD display, design the container for the PCB ...

Dependencies

Examples: acquiring the BME, the microcontroller (which one?), and the LCD display, as well as the adequate tooling, are all steps that are needed in order to start assembling your circuit on a breadboard

Milestones

Example: once you have acquired all the components, assembled them on a breadboard, and successfully read them out with your DAQ program, you can mark the "prototyping phase" milestone as achieved! Were you in time?









WHATARETHE CORE COMPONENTS OF A PROJECT?

A project is established in order to deliver one or more products or results. Such items are usually called **Deliverables**. The project is completed when all the deliverables have been produced.

> The completion of a deliverable can easily be considered a Milestone of the project. On the other hand, Milestones can be associated to accomplishments that are not required to be a deliverable.

It is usually convenient to group tasks and dependencies in a project that belong to a welldefined phase of work - and mark their completion with a **Milestone**. You usually define milestones when you draw the project - setting a target date for them.



Deliverables

Examples: your fully calibrated PCB is a deliverable. The analysis software you wrote to take the data, can also be seen as a deliverable.

Note

Milestones

Example: once you have acquired all the components, assembled them on a breadboard, and successfully read them out with your DAQ program, you can mark the "prototyping phase" milestone as achieved! Were you in time?









All the tasks constitute a Work Breakdown Structure (WBS).

The WBS is characterized by different **Levels**

• Level 1 (L1) elements group the tasks in a more general way, lower levels get more and more specific

The WBS can be organized in different ways - for example:

- Deliverable-based WBS: the WBS clearly defines the relationship between the project deliverables and the scope construction and test, Data Taking & Analysis
- Phase-based WBS: each of the WBS main elements represents a phase of the project. *Example:* in the PCB project discussed before, one can identify 3 phase-based L1 items: PCB design and prototyping, PCB construction, test and calibration, Data taking & Analysis.

How to structure the WBS is your choice (e.g. there is no golden rule on how to do it - it is part of the discretionary power of the project manager). I would suggest a Phase-based WBS, since it better matches the structure of the project within the course.

Riccardo Longo

Example: in the PCB project discussed before, one can identify 3 deliverable-based L1 items: PCB design, PCB



IASKSEDEPENDENHESEMIESTONESEWBSEGANT CHAR

The Dependencies between the Tasks, as well as the Milestones, are displayed by a Gantt chart.

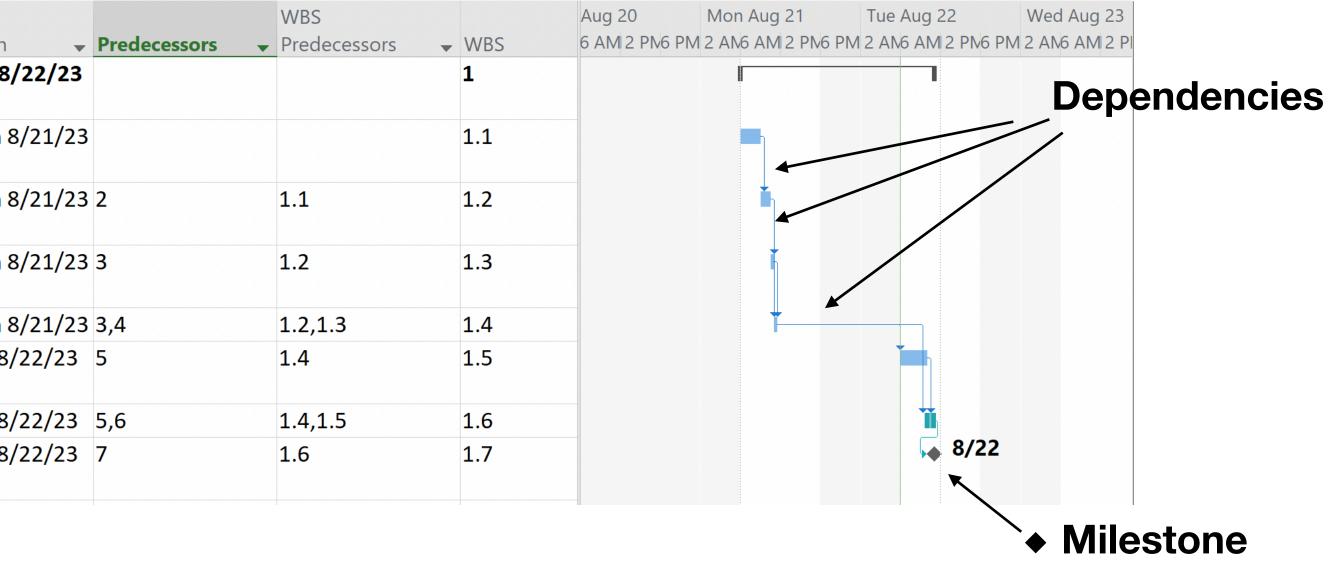
The WBS dictionary and the dependencies seed the logic connections of the tasks in the Gantt chart.

The Gantt chart is the principal tool used to monitor the progress of your project!

			i	Task Mode 🗸	Task Name 🗸	Duration 🗸	Start 👻	Finish
L1 item –		1		□ →	Phase I: Prototyping on breadboard	1.39 days	Mon 8/21/23	Tue 8/
L2 items –	-	2		□ →	Acquire all the circuitry parts	1 hr	Mon 8/21/23	Mon 8
		3		→	Assemble circuit on a breadboard	1.5 hrs	Mon 8/21/23	Mon 8
		4		-	Write code to readout the circuit	0.5 hrs	Mon 8/21/23	Mon 8
		5		□ →	Test of the circuit	0.5 hrs	Mon 8/21/23	Mon 8
	RT	6		- >	Calibration of the BME sensor	2 hrs	Tue 8/22/23	Tue 8/
	CHART	7		×	Test data taking	1 hr	Tue 8/22/23	Tue 8/
	NTT C	8		-	Circuit successfully prototyped!	0.1 hrs	Tue 8/22/23	Tue 8/

NB: This particular chart is named after Henry Gantt, who came up with this concept around 1910 to measure productivity levels of employees and gauge their performance.

Riccardo Longo









523 is the perfect playground for you to become familiar with a project You have just picked a project to address a real-life research issue - that you will address starting from essentially nothing

How do I start?

Prof. Gollin got you covered! The list of topics compiled on the website of PHYS523 is a perfect straw man to use to build your project! Check it out at https://courses.physics.illinois.edu/phys523/fa2023/topics.asp

How do I know what I will be doing 9 months from now? We just started!

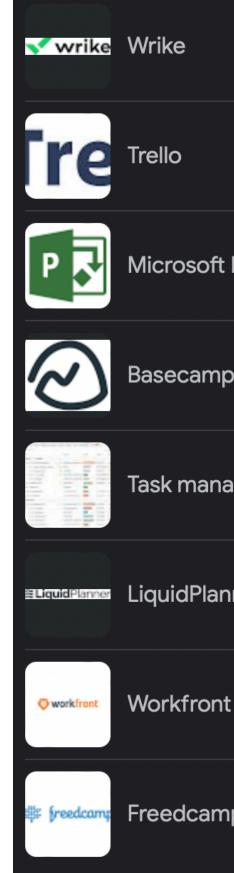
We will learn together that managing a project requires a high level of planning but on reasonable time scales - and that a schedule has to be precise with tasks that are relatively close in time (e.g. you don't need to have precise planning for May 2024 now, instead a more tentative straw man structure that will grow in detail with time). Usually, if your project has a duration of X, is good practice to have a detailed list of tasks for the project in the upcoming X/4 or X/3 period.



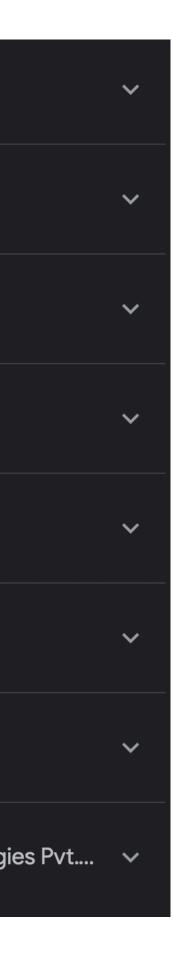
22/08/2023

PHOLEHVARAGEMENSUEWAREZUU

- Different software is available on the market to carry out project management & associated task tracking
- All of them provide a compatible set of main functionality - and differ mostly in interface and specific capabilities

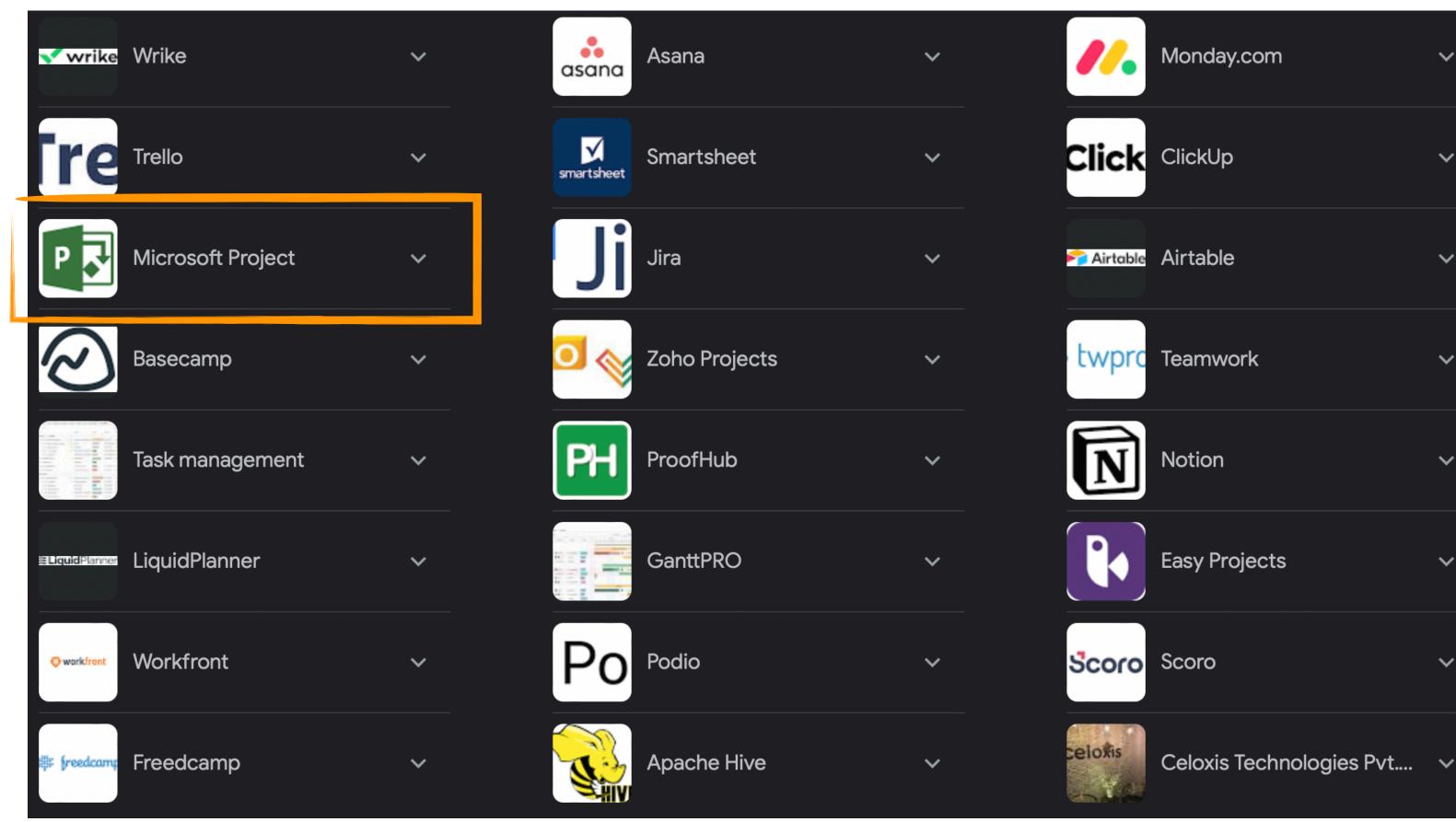


	~	asana	Asana	~	//.	Monday.com
	~	smartsheet	Smartsheet	~	Click	ClickUp
t Project	~	Ji	Jira	~	춛 Airtable	Airtable
ŋ	~	0 💊	Zoho Projects	~	twpro	Teamwork
nagement	~	PH	ProofHub	~	N	Notion
nner	~		GanttPRO	~		Easy Projects
nt	~	Po	Podio	~	Scoro	Scoro
np	~	W	Apache Hive	~	celoRis	Celoxis Technologie

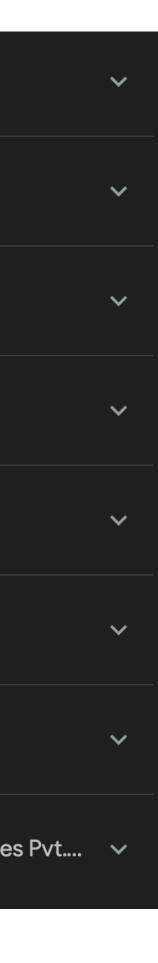




- Different software is available on the market to carry out project management & associated task tracking
- All of them provide a compatible set of main functionality - and differ mostly in interface and specific capabilities
- In this course, we are going to use **Microsoft Project!**
 - Please do not focus on the interface, but on the concepts we will explore together
 - In your next adventure after this master program, either in Industry or in a National Lab, you will likely use different tools, but it will be easy to adapt if you have a good idea of what needs to be done!



Please note that the MS Project app runs only on Windows





- I share the feeling I don't have it too!
- If, by chance, you are using Mac OS and you have **Parallels** you are all set.
- for partitioning or other time-consuming and disruptive actions on your laptop!

<u>UIUCAnyWare</u>: virtual desktop environment allowing students to access software whether remote, on campus, or in class.

- Provides remote access to Windows Desktop from anywhere w/o need for VPN access or other restrictions that may apply to UIUC computing resources
- Loads environment according to your UIUC NetID and keeps memory of your user's space

Instructions on how to install the Citrix Workspace app

Instructions on how to setup the Citrix Workspace app for UIUCAnyWare



• If not - or if you use Linux - no problem - the University provides a program that prevents the need for



Citrix Workspace app



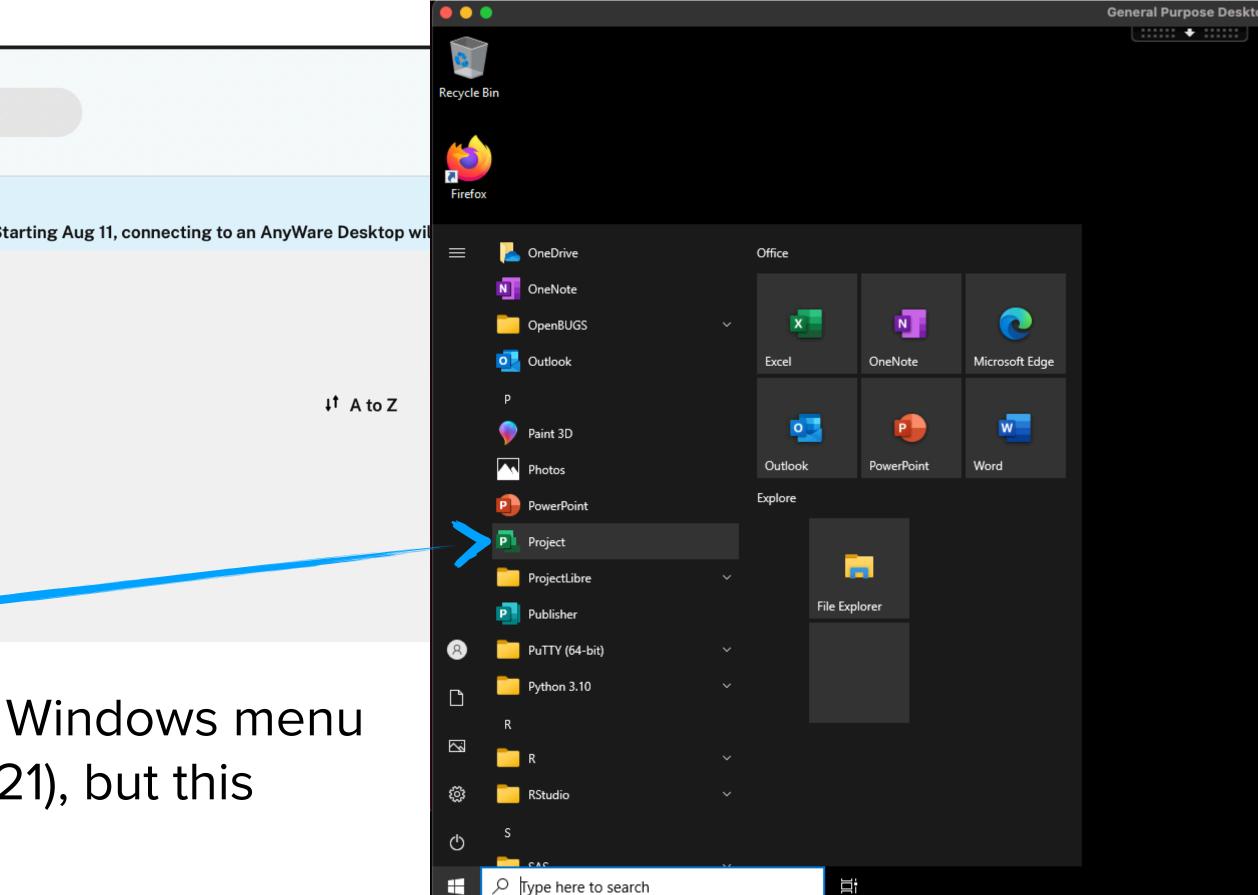


- option and log-in.

UIUC AnyWare	Q Search Workspace
i Privacy Notice and Upcoming Changes Starting Aug 7, the "Apps" menu will no longer show applications. Apps can be accessed t	hrough the UIUC AnyWare Desktops. St
Desktops	
All	
General Purpose Graphics Enabled Desktop Desktop	

- The **Project app** will be already available in the Windows menu
- The version of the software is not the latest (2021), but this should not affect the work for the class!

•Because of a recent (< 2 weeks) change, the "App" installation by the user is not possible anymore • Once you have booted Citrix and logged in UIUC AnyWare, select the General Purpose desktop







AHESSION(HUSDEPHUEHVAU)

• Microsoft Project is available for free for UIUC students via the UIUC webstore • You can download it through https://azureforeducation.microsoft.com/devtools

Home > Education

🗖 Education | Software 👒 …

	«	Machine Learning Server 9.3.0 for Linux	AL+ Machine Learning	LINUX
Overview		Machine Learning Server 9.3.0 for Windows	AI + Machine Learning	Windows
Learning resources		Machine Learning Server 9.4.7 for Linux	AI + Machine Learning	Linux
Roles	_	Machine Learning Server for Windows	AI + Machine Learning	Windows
		Microsoft Endpoint Configuration Manager (current	Server Application	Windows
Software		Microsoft Endpoint Configuration Manager (current	Server Application	Windows
-		Microsoft Configuration Manager, version 2303	Operating System	Windows
O GitHub		Microsoft Hyper-V Server 2019 (updated Sept 2019)	Compute	Windows
Need help?	_	Microsoft R Server 9.1.0 for Hadoop	Database	Windows
Support	Learning Microsoft Configuration Manager, version 2303 Operating System Windows GitHub Microsoft Hyper-V Server 2019 (updated Sept 2019) Compute Windows d help? Microsoft R Server 9.1.0 for Hadoop Database Windows	Linux		
		Microsoft R Server 9.1.0 for Teradata	Database	Windows
		Microsoft P. Sonror 0.1.0 for Windows	Database	Windows
		Project Professional 2021 - DVD	Productivity Tools	Windows
	_			
		Project Professional 2019	Productivity roots	windows
		-		
		-	Developer Tools	
		Remote Tools for Visual Studio 2019 (version 16.0)	Developer Tools	Windows
	•	Remote Tools for Visual Studio 2019 (version 16.0) SharePoint Server Subscription Edition Language Pa…	Developer Tools Productivity Tools	Windows
		Remote Tools for Visual Studio 2019 (version 16.0) SharePoint Server Subscription Edition Language Pa SharePoint Server Subscription Edition Standard	Developer Tools Productivity Tools Productivity Tools	Windows Windows Windows
		Remote Tools for Visual Studio 2019 (version 16.0) SharePoint Server Subscription Edition Language Pa SharePoint Server Subscription Edition Standard Skype for Business Server 2019	Developer Tools Productivity Tools Productivity Tools Productivity Tools	Windows Windows Windows
		Remote Tools for Visual Studio 2019 (version 16.0) SharePoint Server Subscription Edition Language Pa SharePoint Server Subscription Edition Standard Skype for Business Server 2019 Windows 10 Education, version 22H2	Developer Tools Productivity Tools Productivity Tools Productivity Tools Operating System Operating System	Windows Windows Windows Windows
		Remote Tools for Visual Studio 2019 (version 16.0) SharePoint Server Subscription Edition Language Pa SharePoint Server Subscription Edition Standard Skype for Business Server 2019 Windows 10 Education, version 22H2 Windows 10 Education N, version 22H2	Developer Tools Productivity Tools Productivity Tools Productivity Tools Operating System Operating System Operating System	Windows Windows Windows Windows Windows
		Remote Tools for Visual Studio 2019 (version 16.0) SharePoint Server Subscription Edition Language Pa SharePoint Server Subscription Edition Standard Skype for Business Server 2019 Windows 10 Education, version 22H2 Windows 10 Education N, version 22H2 Windows 11 Education, version 22H2 (updated Sep	Developer Tools Productivity Tools Productivity Tools Productivity Tools Operating System Operating System Operating System	Windows Windows Windows Windows Windows Windows
		Remote Tools for Visual Studio 2019 (version 16.0) SharePoint Server Subscription Edition Language Pa SharePoint Server Subscription Edition Standard Skype for Business Server 2019 Windows 10 Education, version 22H2 Windows 10 Education N, version 22H2 Windows 11 Education, version 22H2 (updated Sep Windows 11 Education N, version 22H2 (updated Sec	Developer Tools Productivity Tools Productivity Tools Productivity Tools Operating System Operating System Operating System Operating System	Windows Windows Windows Windows Windows Windows Windows
		Remote Tools for Visual Studio 2019 (version 16.0) SharePoint Server Subscription Edition Language Pa SharePoint Server Subscription Edition Standard Skype for Business Server 2019 Windows 10 Education, version 22H2 Windows 10 Education N, version 22H2 Windows 11 Education, version 22H2 (updated Sep Windows 11 Education N, version 22H2 (updated Sep System Center Data Protection Manager 2022	Developer Tools Productivity Tools Productivity Tools Productivity Tools Operating System Operating System Operating System Operating System	Windows Windows Windows Windows Windows Windows Windows

Riccardo Longo

Software

Education



Project Professional 2021 - DVD

Deliver projects successfully by keeping your projects, resources, and teams organized and on track with Project Professional 2021. Easily plan projects, monitor status, and hover over team members names in a project plan to see availability with online presence for chats or calls via Microsoft Teams. Quickly sync Project schedules and plans with Project Online (as a part of Project Plan 3 or Project Plan 5) and Project Server Subscription Edition. Project Plan 3, Project Plan 5, Project Server Subscription Edition, and Teams are sold separately. Project Professional 2021 supports Long-Term Servicing Channel (LTSC).

 \times

D

Operating System Windows

Product language English System 64 bit

Product key

8N8RJ-PHXYP-4M34T-TBRH6-724YV

A Help improve this page



64 bit

04 DIL

64 bit

64 hi

64 bit

Download

Cancel

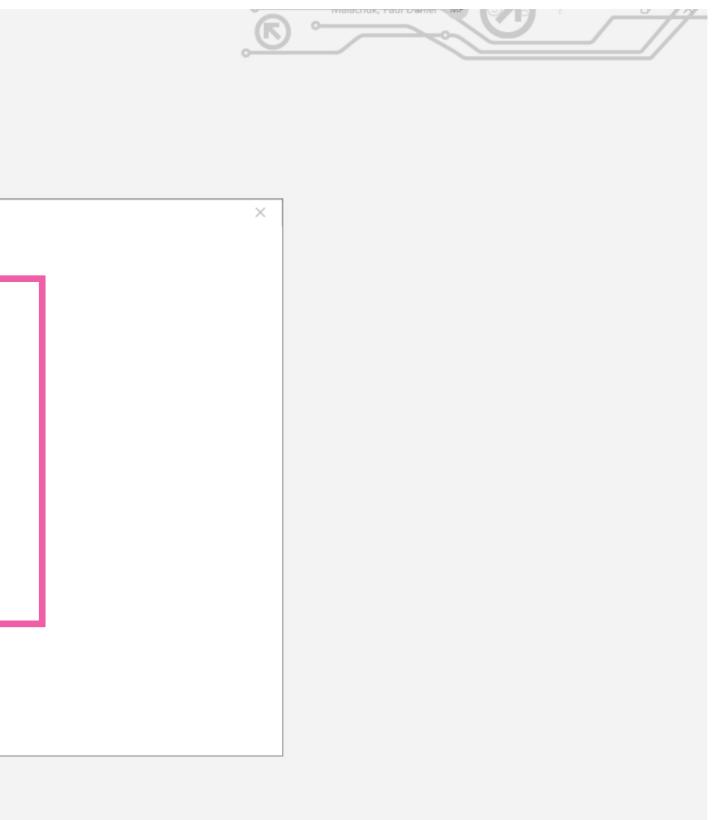


• Microsoft Project is available for free for UIUC students via the UIUC webstore • You can download it through https://azureforeducation.microsoft.com/devtools

Project	Account	
₩ Home	MP Malachuk, Paul Daniel pauldm2@illinois.edu	Product Information Product Activated Microsoft Project Professional 2021
New	About me Sign out Switch account Account Privacy Manage Settings	Microsoft Enter your product key
Dpen	Office Background: Circuit Office Theme: Colorful Connected Services: OneDrive - University of Illinois - Urb pauldm2@illinois.edu Sites - University of Illinois - Urbana pauldm2@illinois.edu Add a service ~	
		<u>See product key examples</u> <u>Back</u>
Account		
Feedback		

Riccardo Longo

Options



Step 1 Download and install **Project Professional 2021** on your windows machine (or VM)

Step 2 Save your **Product Key**

Step 3 Once installed, launch Project and insert your **Product Key**

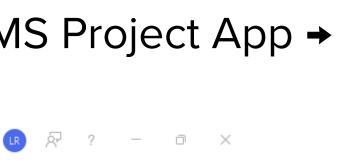




Once you get your MS project setup - you can open the MS Project App →

	Project Professional	Longo, Riccardo
Project	Good afternoon	
1 Home	New	
New	Blank Project Sprints Project Waterfall Project New from existing project	New from Excel workbook
☐ Open	Search Pinned	
	Name	Date modified
	P- ZDC_WBS-Tasks SharePoint - University of Illinois - Urbana » SiteAssets	11/4/2020
	9.1.7 OneDrive - University of Illinois - Urbana » ZDC_Upgrade » RiccardoL3	8/9/2020
	P- Project Breakdown Structure OneDrive - University of Illinois - Urbana » ZDC_Upgrade	8/9/2020
Account		
Feedback		Activa

Options





- Let's start with a simple example e.g. not immediately your group project
- Select "Blank Project"!

More projects \rightarrow

ew from SharePoint Tas

More templates \rightarrow

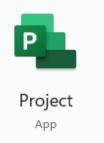
ate Windows Go to Settings to activate Windows.





Once you get your MS project setup - you can open the MS Project App →

3	り	<₽ *	▼					oject1 - Project Professional	Longo, Riccardo	LR -	- 0	>
е	Task		rce Report	Project	View	Help	Timeline Form	t \mathcal{P} Tell me what you want to do			Ō)
1on 8	Start /21/23						Add	asks with dates to the timeline			Finish Mon 8	
	i	Task	Task Name		Dunation	Chart	rt. t.l.	6, '23 Aug 13, '23 Aug 20, '23 Aug 27, '23 Sep 3, '23		Sep 17,		Se
1			 Task Name 	•	Duration			TWTFSSMTWTFSSMTWTFSSMTWTFSSMTW		2 2 IVI I	V I F S	0 0
•									Ar Ge	ctivate Windows to Settings to activate	e Windows.	►



- Let's start with a simple example e.g. not immediately your group project
- Select "Blank Project"!
- Now let's save this project. You should all have received an invitation for a UIUC OneDrive folder called "PersonalTestProjects". Save your project there with the following name format NameSurname2023Test
- To save go to File > Save As > OneDrive -University of Illinois - Urbana > Phys523_ClassOf2023-2024 > PersonalTestProjects > YourNetID



22/08/2023

• Let's start together and try to replicate the simple WBS shown in this Gantt chart



- Let's take it to the **interactive mode** from now on!
- Next step is to define Phase II design and production of PCB and its 3D-printed case
- Then you can go with Phase III Assembly, Test and Data taking
- and milestones

Riccardo Longo



• The time between tasks at the moment is not crucial - we will discuss this in the next lectures! Focus on dependencies





TAKEHOMEWORKANDNEXTCLSS

- You should try to complete the pilot task by the next class! We will have a brief Q&A session before starting with the next lecture on Thursday.
- will find me in Loomis 481. If you plan to stop by, please send me a message in advance to
- In the next lecture, we will start working on your class project! How will you collaborate on a MS Project? What are the different roles in a project? Who is in charge of keeping the others on track? management!



•I am available for walk-in office hours tomorrow, Wednesday August 23rd, from 3:30 to 5:30 PM. You rlongo@illinois.edu, such that we coordinate and avoid pile-up and long waiting times for everyone!

Spoiler alert: everyone will be (in rotation). Taking charge is an essential aspect of successful project



BACKUP SLIDES

PROJECTS IN NOUSTRY & RESEARCH

Let's now take it to the next step - What is a project in the industry?

In industry, a project is a temporary and one-time exercise which varies in duration. It is undertaken to address a specific need in an organization, which may be to create a product or service or to change a business process.

Example: a company manufacturing electric trucks would like to develop a new recharging system for their vehicles. The R&D division is asked to formulate a project to achieve this goal in the shortest and most cost-effective way possible.

...and in research

A project is a typical working package proposed to advance research/develop technology in a specific field. Usually starts with an innovative idea, formulated into a project on a (multi-)year basis. The project is submitted to a funding agency/University/Federal government department/etc. in response to a specific funding opportunity announcement (FOA)

Example: the CERN Large Hadron Collider (LHC) will be upgraded to High-Luminosity LHC (1 B\$++). The experiments detecting the collisions at the accelerator will also upgrade their detectors in order to take advantage of the new machine capabilities. Several M\$ projects supporting multi-institution international efforts







