

# **Individual Projects (Practice)**

Learning Software Engineering  
by Doing Alone

ASE

ASE @ Northern Kentucky University

## Chapter 1: Individual Project

The team now understands how the team project process works.

- The individual project is about solving problems alone to demonstrate that each team member can work independently.
- Compared to the team project, the individual project is simpler as there is only one developer.
- However, the individual project still follows almost the same process as the team project.

# Notice

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**Important:** Before starting the individual project, students must read and understand the team project process covered in other stories.

The individual project builds on the same principles but focuses on solo execution.

In this story, we will cover only the key differences, tools, process, and best practices for succeeding in the individual project.

# Individual vs Team Projects: Key Differences

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The team gathers around Ken's laptop as he opens the course syllabus.

**Ken**

"Okay team, here's something important: we're not just doing one project this semester - we're doing two."

**Tim**

"Two projects?! I thought we're just building the to-do app together."

**Ken**

"That's the team project. But there's also an individual project."

## ***Why Two Projects?***

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**Jane**

"Why do we need both? Isn't one project enough?"

**Ken**

“Great question. They teach different skills:”

## Team Project: Collaboration Skills

Team Project teaches:

- Working with others (communication)
- Managing shared codebase (Git conflicts!)
- Dividing work effectively
- Coordinating schedules
- Dealing with different coding styles
- Team leadership (for team leader)
- Professional collaboration skills

Real-world parallel:

→ 90% of software engineering is team work

## Individual Project: Personal Excellence

Individual Project teaches:

- Taking full ownership
- Making all decisions yourself
- Showing your unique skills
- Working with AI tools independently
- Building complete features alone
- Creating your personal portfolio piece

Real-world parallel:

→ Your individual project portfolio proves YOUR capabilities

<b>Aspect</b>	<b>Team Project</b>	<b>Individual Project</b>
<b>Team Size</b>	2-4 members	1 (you alone)
<b>Communication</b>	Daily standups, weekly reports	Weekly progress to Canvas
<b>Scope</b>	Larger (divided work)	Smaller (all by you)
<b>Presentations</b>	Weekly progress meetings	One presentation (2nd iteration)
<b>GitHub</b>	Shared repository	Your own repository
<b>Canvas Pages</b>	Team + Contribution pages	Individual + Contribution pages
<b>Dependencies</b>	Coordinate with teammates	None (self-contained)
<b>Decision Making</b>	Team consensus	Your decision

**Tim**

“So, for the individual project, I have to do everything alone, right?”

**Ken**

“Yes, you have to do everything alone, but you can ask for help from your peers or the instructor when you face problems.”

**Julie**

“Also, the skills you learn from the team project will help you succeed in the individual project. For example, understanding version control, project management, and software design will make your individual work much smoother.”

## *Why Work Alone?*

**Tim**

“I thought software engineering was all about teamwork. Why do I need to work alone?”

**Julie**

“Because in the real world, you need both skills. Sometimes you discover a problem and want to solve it yourself—that’s where individual projects matter.”

**Tim**

“Can you give me an example?”

**Julie**

“Sure! There was a software engineer who was frustrated by slow, storage-limited email systems, he experimented with using web technologies and Google-style search to build something dramatically simpler and more powerful.”

**Julie**

“That small individual project eventually evolved into Gmail and transformed how the world uses email.<sup>1</sup>”

**Tim**

“Wow! So an individual project can become something big?”

**Julie**

“Absolutely. You choose a problem you care about, design a solution, build it, and test it yourself. You prove you can solve **any** problem independently.”

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<sup>1</sup>Gmail began as a 20% individual project by Google engineer Paul Buchheit.



## ***The Importance of Individual Projects***

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**Jane**

“So, in shoart, the individual project shows that I can work independently and deliver a complete solution on my own.”

**Tim**

“And you’re saying that it’s important for my portfolio, and ultimately my career?”

**Julie**

“Yes. Also, the individual project becomes part of your personal portfolio that you can showcase to potential employers. It demonstrates your skills, problem-solving ability, and dedication without relying on others.”

### **Why Individual Projects Matter:**

**In industry, you’ll sometimes need to:**

- Prototype a solution independently
- Research and implement a new technology
- Build proof-of-concepts before team work
- Own a feature end-to-end

**Individual projects prove you can:**

- Work autonomously
- Make technical decisions
- Manage your own time
- Deliver complete solutions

### **Common Mistake #1: Treating Individual Project as 'Less Important':**

✗ “It’s just me, so I don’t need to plan or document”

✗ “I’ll wing it since no one’s watching”

✓ Follow the same rigorous process as team project

✓ Document for **your future self** (you’ll forget!)

**Why?** Professional work often involves solo projects. Build good habits now.

## Chapter 2:

# Finding Individual Project Topics

The next step is to choose a topic for your individual project.

- Choose the topic that interests you.
- Choose the topic that solves the problem, in other words, build the app that you are going to use.
- Choose the topic that helps you grow your skills.
- Choose the topic that you will be proud of.

**Tim**

“I’m not sure what problem to solve for my individual project. Any suggestions?”

**Julie**

“Well, I think the best way to choose a topic is to think about problems you face in your daily life. What are some challenges or inconveniences you encounter regularly?”

**Jane**

“That makes sense. But, Julie, how about you? How did you choose your topic?”

### ***Julie’s Story: TravelBuddy***

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**Julie**

“Well, for my individual project, I wanted to solve a problem I personally faced. I love traveling, but I always struggled with organizing my itineraries and managing my travel budgets effectively.”

**Tim**

“So, you wanted to build an app to help with that?”

**Julie**

“Yes, that’s the problem that I wanted to solve. I decided to create ‘TravelBuddy,’ an application that helps users plan their trips, organize itineraries, and track expenses all in one place.”

**Jane**

“That sounds really useful! But wasn’t it challenging to build an app from scratch?”

**Tim**

“Yeah, I’m also curious! How did you start? Did you know all the technologies you needed?”

**Julie**

“Not at all! I knew Node.js, a bit of React, and NoSQL databases. I was in ‘unknown unknown’ territory—I didn’t know what I didn’t know.”

**Tim**

“That sounds scary! Weren’t you worried?”

**Julie**

“Yes, but I knew **why** I needed to solve the problem. So I just started with what I knew. Then I discovered Electron and React Native while browsing YouTube—they were exactly what I needed!”

**Tim**

“I remember that’s called the ‘Red Car Theory’<sup>2</sup> from class, right?”

**Julie**

“Exactly! I only noticed those tools because I had already started my project.”

## *Taking Risks*

**Tim**

“But what if you fail? In a team project, that would be a disaster.”

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<sup>2</sup>Red Car Theory: Once you start looking for something specific (like a red car), you suddenly see it everywhere. Your brain filters information until it becomes relevant to you.

**Julie**

“That’s the difference! In team projects, we play it safe to deliver what we promise. In individual projects, we can take risks and learn from mistakes.”

**Tim**

“So individual projects are for learning and exploring?”

**Julie**

“Yes! Once I knew **why** (solve my travel problem), I figured out **what** (web, desktop, mobile app). The **how** was easy—just use the right tools.”

**Tim**

“So AI and YouTube<sup>3</sup> can teach you ‘how,’ but you are the only person in the world who can come up with ‘why’?”

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<sup>3</sup>You can find other resources that teach us ‘how’ to solve the problems, including classroom discussion.

**Julie**

“Exactly! And managing complexity was the real part of the project—not the coding<sup>4</sup> I had to revise my plan, switch databases when one didn’t work with Electron, and battle endless complexity.”

**Tim**

“But you finished it?”

**Julie**

“Yes! I solved the problem I set out to tackle in the end. It wasn’t easy, but every obstacle taught me how to manage complexity, and every mistake helped me grow. I learned from my peers, and I was able to support others with the experience I gained. Now I feel confident that I can take on **any** challenge—whether I’m working alone or with a team.”

## ***Tim’s Turn***

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Tim thinks about what problem he wants to solve.

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<sup>4</sup>In the real world, most software engineers spend less than 30% of their time for coding/programming. The percentage becomes less and less as they progress their career. Most of their time is used for better problem solving, not coding



*Tim thinks*

*“I use ChatGPT every day, but I sometimes cannot find my old prompts and answers. There are too many conversations!”*

He keeps asking.

*Tim thinks*

*“What if I could tag my prompts so I can search and organize them easily?”*

Tim smiles. He knows **why** he wants to solve this problem. Now he just needs to figure out **what** to build and **how** to build it.

**Tim**

“OK. I will call my project TagGPT!”

## *Jane's Turn*

Jane thinks about what problem she wants to solve.

*Jane thinks*

*“I learn many programming languages, and I need to memorize many syntax, libraries, and functions. Also, I need some code snippets for common tasks.”*

She keeps asking.

*Jane thinks*

*“Is there a way to combine the two ideas? What if I build an app that helps me memorize syntax and provides code snippets for common tasks?”*

Jane smiles because this is the app that she needs, but she cannot find anywhere yet. She has the idea now. All she needs to do is figure out **what** and **how**.

**Jane**

“I will call my project AnkiCode!<sup>5</sup> I will build a flashcard app for programming languages, but the app can be used for code snippets!”

Their journeys begin.

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<sup>5</sup>Anki is a popular flashcard app that helps users memorize information using spaced repetition.

## Chapter 3:

### Stage 1: Preparation

The individual project process is similar to the team project process and it has three stages.

In this chapter, we will focus on **Stage 1: Preparation**, which includes planning and preparing for the individual project during Weeks 1 to 3, culminating in the **Project Plan Presentation (PPP)** at Week 4.

We don't have PPP for the individual project, but you still need to prepare the project plan document and weekly plans in this stage.

## Same Process and Tools as Team Project

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The team has just finished their team project planning and is now preparing for their individual projects.

**Ken**

“But most of the processes are pretty much the same as the team project. You have to define the problem you want to solve, propose solutions, define features and requirements, design the architecture, implement the code, and test the software.”

**Julie**

“Also, you use the same tools as the team project—GitHub for artifacts, and Canvas individual project page for communication and submission.”

**Ken**

“I found that the professor created two individual project Canvas pages for us: individual project overview page and individual project contribution page.”

**Julie**

“Then, you guys need to create a separate GitHub repository for your individual project too.”

## ***Your Project Workspace***

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They already have a team GitHub repository and Canvas pages for the team project, so building up the individual project workspace is straightforward.

### **Tim**

“So, I have two GitHub repositories: team and individual project repositories, and I have four Canvas pages: team project page shared by my team, team project contribution page, individual project page, and individual project contribution page.”

### **Ken**

“Exactly! All final evaluations, both team and individual projects, are based on these artifacts from the GitHub repositories and progress reports from the Canvas pages.”

### Team Project GitHub & Canvas Pages

<b>Resource</b>	<b>Purpose</b>	<b>Owner</b>
<b>Team GitHub Repo</b>	Team code, tests, docs	Team (shared)
<b>Team Canvas Page</b>	Team goals, schedule, links	Team Leader
<b>Team Contribution Page</b>	Your team contributions	You

### Individual Project GitHub & Canvas Pages

<b>Resource</b>	<b>Purpose</b>	<b>Owner</b>
<b>Individual GitHub Repo</b>	Your code, tests, docs	You only

<b>Individual Canvas Page</b>	Individual project overview	You
<b>Individual Contribution Page</b>	Weekly progress	You

**Julie**

“Just like the team project, any information about your individual project should be found easily.”

## **Common Mistake #2: Poor Organization:**

- ✗ All files in root directory
- ✗ No documentation structure
- ✗ Tests, docs, mixed with source code

- ✓ Clear directory structure
- ✓ Separate docs, src, tests folders
- ✓ README.md as entry point

**Why?** Future employers (and your future self) need to understand your project quickly.

## ***The Same Process***

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Once they have their individual project workspace ready, Ken explains the individual project process.

**Ken**

“The individual project process is similar to the team project process. You need to follow the same process: problem definition, proposed solutions, features and requirements, architecture design, implementation, and testing.”

**Jane**

“So, in the first stage, I need to make ready for the individual project plan presentation (PPP) like the team project, right?”

**Ken**

“Yes, but you don’t have to present it to anyone. You just need to prepare the project plan document and weekly plans for your individual project.”

**Julie**

“But you need to make a presentation for the individual project during the 2nd iteration, so you need the PPP anyways.”

Ken, Jane, and Tim kept working on their individual project. They could finish the READE.md, features and requirements, architecture diagram, and test outlines for their individual projects by the end of Week 3.

They could make the PPP slide and upload all the necessary documents to their individual project GitHub repository.

Then, they setup their individual project Canvas pages that has all the links for their individual project GitHub repository and documents.

They could finish HW2, individual project part, by the end of Week 3 as well.

They are ready to dive into Stage 2: Prototype/MVP in Week 4.



# HW2

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Just like the team project, they need to complete HW2 that has two parts: team project part and individual project part.

Even though the team project part is already done and submitted by the team leader, they all need to complete the individual project part by the end of Week 3.

Fortunately, they already have all the necessary documents and plans for their individual projects. All of them could submit their individual project part of HW2 on time without any problem.

**Tim**

“I just submitted my individual project part of HW2.  
How about you guys?”

**Jane**

“Me too. It was straightforward since I already had everything ready for my individual project.”

**Ken**

“Same here. The individual project part of HW2 was easy to complete since I had all the documents and plans ready.”

**Jane**

“Ken, by the way, thanks for uploading the team project part of HW2 on time also.”

**Ken**

“No problem. As the team leader, it’s my job. Now, I’m looking forward to starting Stage 2: Prototype/MVP next week.”

## Chapter 2:

### Stage 2: Prototype/MVP

In this chapter, we will focus on **Stage 2: Prototype/MVP**, which includes building a working prototype or minimum viable product (MVP) for the individual project during Weeks 4 to 8, culminating in the **Individual Project Presentation** at Week 9.

## ***Sprint 1***

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The team has just finished their team project discussion.

**Ken**

“By the way, how’s your individual project coming along?”

**Jane**

“So far so good. I just finished the first feature and three requirements. When I can finish the acceptance tests, I think I can finish my first milestone. How about you?”

**Ken**

“Almost the same. I found that need to change some of the architecture diagram and update my software design. Then, coding should be straightforward.”

**Tim**

“I am a bit behind you guys. I’m trying to catch up with all the technologies and tools I need to use for my individual project. But I think I can finish my first milestone by the end of this week.”

**Ken**

“Great! Don’t worry if you feel you are behind, especially in the 2nd stage. The important thing is to keep making progress and learning along the way.”

**Jane**

“Yeah, I find the individual and team project complement each other and provide different learning experiences.”

**Ken**

“I’m glad to hear that. Let’s keep pushing forward and make the most of both projects!”

The stage 2, sprint 1, for the individual project is mainly about transforming ‘unknown unknowns’ into ‘known knowns’ by building a working prototype or MVP that demonstrates the core functionality of the proposed solution.

Some team members may face challenges in learning new technologies or tools required for their individual projects, but they are learning how to solve problems by managing complexity as a solo software engineer.

## **HW4**

The end of Sprint 1 is nearing and the team members are preparing for their first sprint review (S1R) and sprint planning (S1P) for their team project.

**Tim**

“By the way, have you guys prepared for your individual project sprint review and planning?”

**Jane**

“No. We don’t have to that.”

**Ken**

“Yeah, but don’t forget to submit your individual project report as a part of your HW4.”

**Jane**

“Oh, right. I almost forgot about that. Thanks for the reminder!”

**Ken**

“No problem. Just like HW2, I’ll take care of the HW4 submission for our team report. Just make sure to complete your individual project report before the deadline.”

**Team**

“Got it! We’ll make sure to finish our individual project reports on time.”

## Chapter 2:

### Stage 3: Project

In this chapter, we will focus on **Stage 3: Project**, which includes individual project presentation. After the presentation, what is left is the final individual project submission.



## Stage 3: Project Execution

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The team has just finished their first team meeting in the sprint 2.

**Jane**

“How’s your individual project coming along? Did you sign up for your individual project presentation slot yet?”

**Tim**

“Yes, I just signed up for mine. I’m scheduled for Week 10. How about you?”

**Jane**

“I’m thinking about Week 12. I want to have some extra time to polish my project after the presentation.”

**Ken**

“Actually, you don’t have to wait to polish your project. All you have to do is to share your progress and get feedback during the presentation. Then, you can continue working on your project after the presentation until the final submission deadline.”

**Tim**

“I think you’re right. All of my project documents, code, and tests are already in my GitHub repository, and they are easily accessible from the Canvas pages. So I can just present what I have so far.”

**Ken**

“Yes, actually, making constant progress based on the plan is the most important thing in this stage. The presentation is just a checkpoint to share your progress and get feedback from the professor and peers.”

**Jane**

“That makes sense. I will focus on completing my project according to my plan and use the presentation as an opportunity to get feedback.”

**Ken**

“Yes. Don’t rush and finish everything at the last moment. It will only add more stress. Also even worse, the project results will be really bad if you try to cram everything at the last minute.”

**Tim**

“I see. Now I understand that software engineering is not just about coding, but also about managing time and complexity effectively. Last minute rush never works in real world software engineering. So, I won’t be surprised if it is the same as the individual project.”

## ***Individual Project Presentation***

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Team members sign up for their individual project presentation slots on the Canvas page. On the day of the presentation, each team member presents their individual project progress to the professor and peers.

But this time, the presentation is more informal and focused on sharing progress rather than a formal presentation like the team project PPP.

They have a talk after their usual team meeting.

**Jane**

“Tim. I like your TagGPT. It’s really impressive how you integrated GPT-4 into a desktop application using Electron.”

**Tim**

“Thanks, Jane. I had no idea in the beginning, but I learned a lot while building it. The Red Car Theory really worked for me—I kept discovering new tools and techniques as I progressed.”

**Ken**

“Also, I could see that many students are interested in your project. TagGPT could be really useful for developers who want to automate tagging tasks.”

**Tim**

“I hope so. I’m also excited to get good feedback from other students. They gave me some interesting ideas during the presentation.”

Team members are experiencing the ‘joy of building things’ and begin to think that they want to do it for the rest of their careers<sup>6</sup>.

### ***Final Individual Project submission***

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After the individual project presentation, team members continue working on their individual projects until the final submission deadline.

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<sup>6</sup>Software engineering is satisfying, rewarding, and fulfilling; if we can solve problems as a professional.

Team members are busy finalizing their projects, fixing bugs, and polishing their code and documentation. But at the same time, they are finalizing their individual project as well.

They just finished their final team meeting.

**Ken**

Thanks for your hard work. Now, don't forget to submit your final individual project on time also."

**Jane**

"Yes. I know we should submit our final individual project."

**Ken**

"Yes. As a team member, you should submit your evaluations and individual project to finalize this course."

**Jane**

"Got it, and as a team leader, you should also submit the team project results together with the team members' evaluations and individual projects."

**Ken**

“Actually, team members’ evaluation is a part of the team project submission. So, I will take care of that. Just make sure to submit your individual project on time.”

The team members submit their final individual projects on time without any problem.

They finish this course, and they have two more projects that they can add to their portfolios.