IDEaL

An IDE for all Learners

Hello World!

Jin-Hee

Designer

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PM

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PM/Engineer

Our Team

Passion for CS Education

~10 years total experience as tutors, SLs, TAs, and head TAs, with a focus on intro CS courses

Diversity in Experience

Prior academic and internship experience in product management, design, and SWE roles

Software Development Background

Experience developing large software projects in a variety of languages, as well as tackling CS security + AI model development challenges

Problem

Learning to code can be a frustrating, overwhelming, and discouraging experience.

Pain Points:

- Incomprehensible error messages
- Complicated, feature-heavy IDEs
- Domain-specific jargon → high barrier to entry

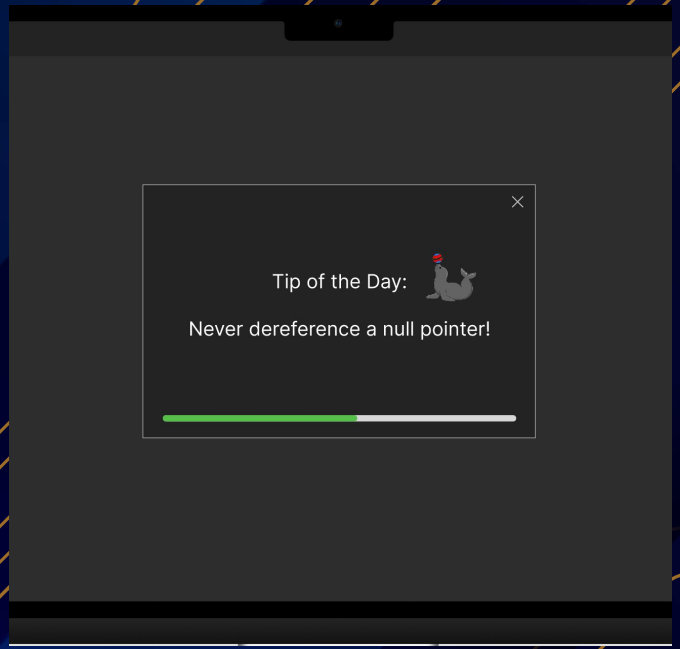
Desires:

- Prioritization of code style/efficiency
- Help in learning language idioms

"I was nervous going into [intro] classes because I feel like I don't have a ton of CS background, and everyone else does."

"It can be tough to figure out why my computer is struggling to run programs - is it something inefficient in my code?"

"I don't want an error message that just tells me what line an error is at...Name the variable. Say specifically what is bad."



Solution

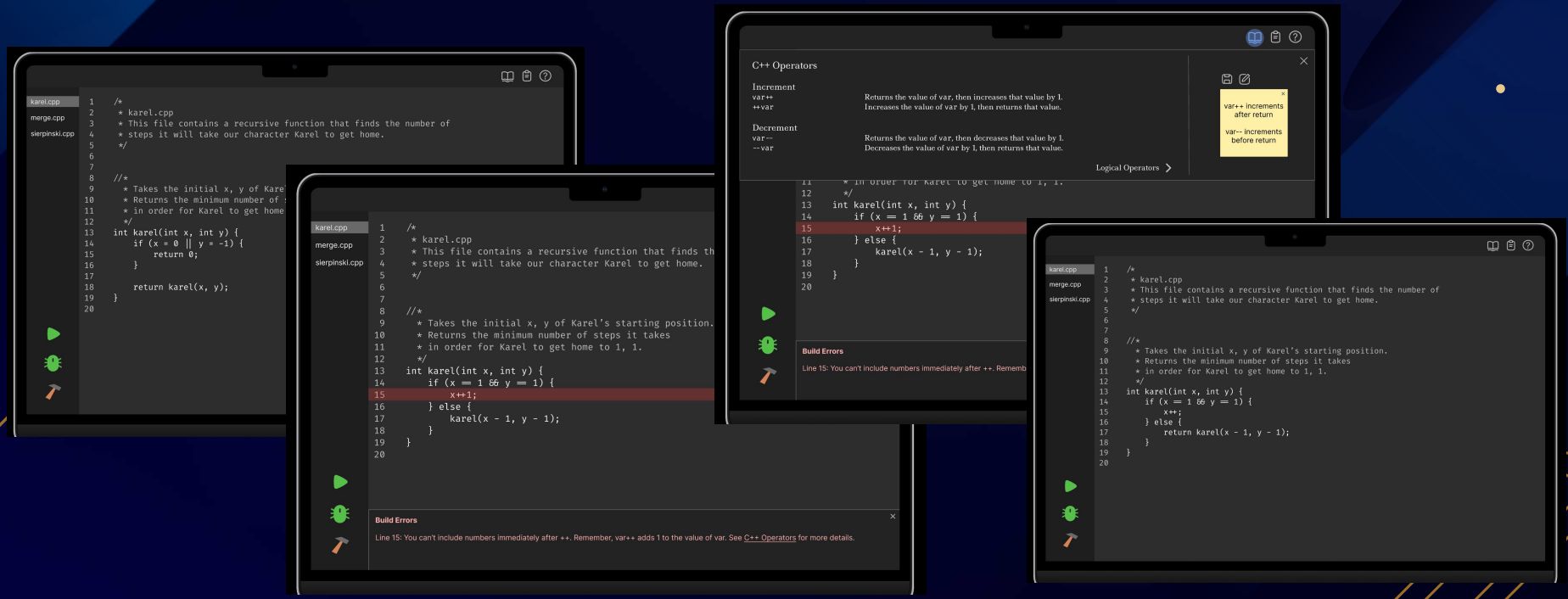
IDEaL - An educational IDE for all programming learners.

We make the process of learning to code less overwhelming, providing students with an understandable, encouraging, and fun way to program. Our solution offers:

- Support with deciphering opaque errors when debugging
- Simple and easy-to-use interface
- Learn-as-you-go integrated programming lessons/resources

Happy Path

When coding... I can see what isn't working... Have the understanding to fix it... Then fix it and learn!



Key Product Features

- Simple, working IDE with the following learning-friendly features
- Error messages with "plain English," beginner-friendly wording
- On-the-fly style tips so you can improve style as you're coding
- A place to review conceptual material that’s relevant to the course/current assignment
- A way to keep "sticky notes" for key learnings

Market Fit (TAM/SAM/SOM)

- There were **26.8 million** active software developers in the world at the end of 2021.
- Obtainable market: students studying CS at Stanford.
  - ~10% of students who take CS106A/B → ~**360 people**.
- ~1200 students per quarter across both classes → ~3600 for the whole year.

Competitive Landscape

- Main competitors in the space include:
  - VSCode
  - Sublime Text
  - JetBrains
- Data mining across VSCode has been subject to criticism (CoPilot)
- No one focuses on beginning programming (yet)

Business Model - Prosumer

Community

Free offering with key features (e.g. friendly errors, style feedback, crowdsourced lessons). Students contribute to feedback dataset

$0

Institutional

Adds limited course integration with grading, student submission storage, course resources, integrity checkers (e.g. MOSS)

$2.50 per student per course annually

Institutional+

Adds full course integration with live TA debugging session support, analytics on course and assignment performance

$5 per student per course annually

Projected Revenue

Community	Institutional	Institutional+
Free!	Assuming 20 courses at each university and ~200 students/course $10,000/yr/school	Assuming 20 courses at each university and ~200 students/course $20,000/yr/school

Traction

Right now...

- A handful (~40-50) CS106 students we've interviewed have expressed strong interest in this support from an IDE
- No formal plan / signup
- Raised discussion with Stanford's intro CS faculty → interest
    - Growing frustration with IDEs like Qt already

Looking ahead...

- Maintain discussion with Stanford CS faculty
- Beta testing on CS106 students
    - Test and make improvements before official partnerships
- Introduce to section leaders *
- Branch out to intro CS at other institutions nearby, likely Cal, SCU

Projections

- Current: proof of concept shown, interviews done, revenue models built out
- In next 6 months: build out MVP, ship as VSCode / Sublime extension
- In next 12 months: secure funding, build standalone application for macOS, Linux, and Windows
- In next 18 months: Sell to consumers, universities. Ship V2 of product with enhanced feature set and specific settings for university clients

Funding and Resource Request

Needs:

- Engineering staff: 3 engineers to start
- Marketing to universities: 5 employees on marketing team
- Design of application: 3 designers working on MVP to pitch to investors

Estimate in seed funding: $3M

Appendix

Ethical Concerns

Quality of education

- What is the source of the educational content? Is it true, up-to-date, etc?

Partnering with universities / learning institutions

- Who ultimately controls the content on IDEaL? What if we disagree?

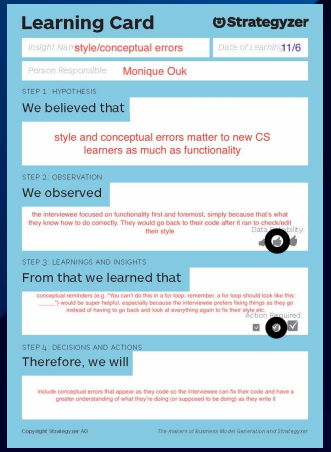
Accessibility

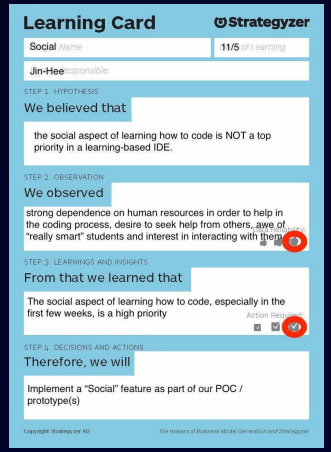
- When implementing the technological features such as sticky notes or supplemental error messages, can they be found and read by a text-to-speech, for example?

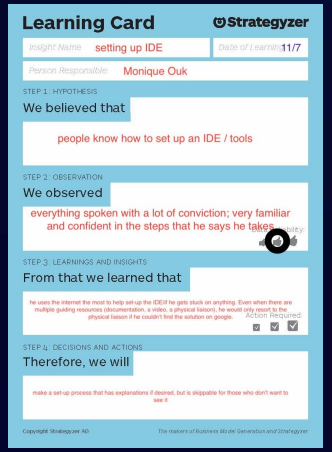
Traditional pedagogy and progress

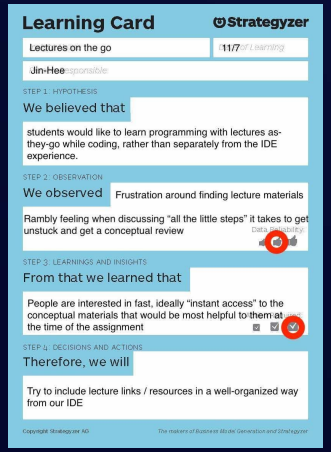
- Are we assuming that our way of learning will work for everyone instead of working the other way around?

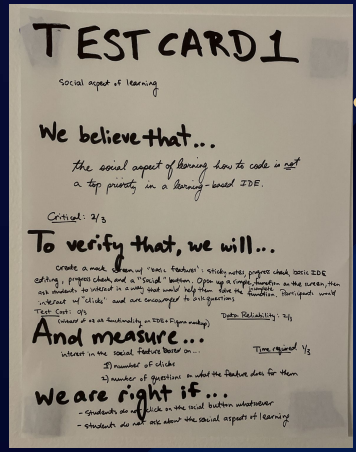
Role Prototype (Cards)

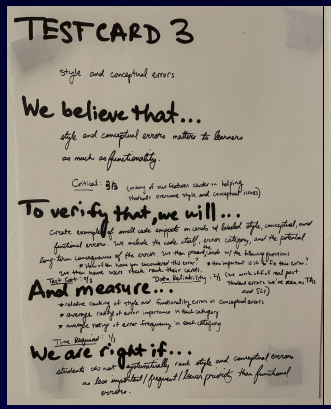


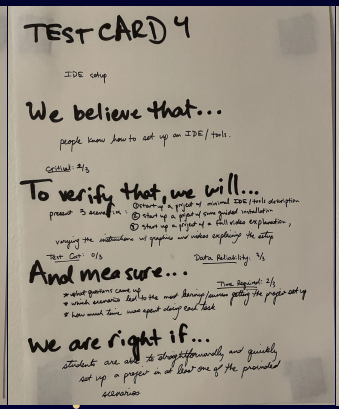


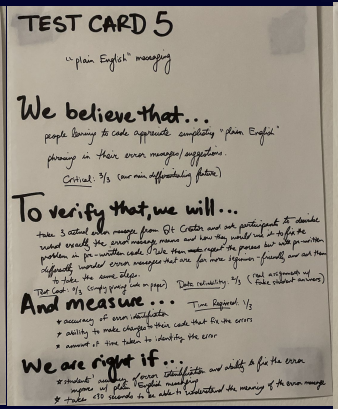


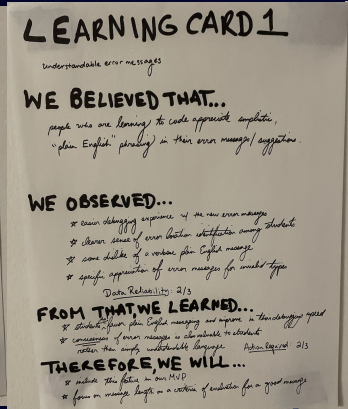


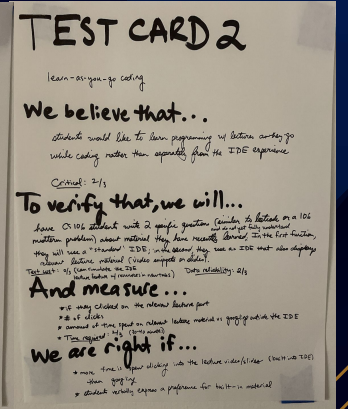












Role Prototype (Insights)

Our top 3-5 synthesized insights:

- Error readability can greatly affect a beginner's motivation level/dedication to continuing CS.
- On-the-fly conceptual reminders are very helpful, especially because our interviewees liked to fix their code as they go instead of having to go back at the end to fix things.
- People want fast/"instant" access to conceptual material that would be most helpful to them for their assignment.

Role Prototype

Our product's value comes from being a text editor that lets you learn as you go. A typical user could be a CS106A student. When the 106A student starts an assignment using our IDE, they'll have immediate access to the lectures and course notes relevant to the assignment they're currently working on. As they begin coding, the IDE will highlight any style issues alongside a suggestion on how to improve it, which allows the user to fix their style in the process, instead of having to go back and potentially getting lost in their own code. Any errors will also be flagged and explained in "readable", plain English, which lets the user thoroughly understand the mistake they made, and how to avoid repeating that problem. The user has the option of making "sticky notes" to jot down anything they want to remember, such as a mistake they've formerly made, or specific syntax they constantly forget, etc. Weak signals that indicate our product's value would include some usage of the sticky notes. Although the user may not be using the sticky notes frequently, the fact that they're utilizing the sticky feature *at all* indicates that the user does want the option to keep their own notes (in their own words) in addition to the help that the IDE provides. Strong signals that indicate value include high retention in the IDE (e.g., not frequently clicking out or for long periods of time) since the user no longer has to heavily google the meaning of error messages and less repeated style issues, which means that the user is actively reading the style suggestions and correctly implementing the advice as they move forward. After all of our assumption and experience prototype testing, the features we will include in our GTM strategy include 1) readable error messages, 2) style suggestions, 3) relevant conceptual notes, 4) sticky note features. These four key features were proven to make the IDE valuable for the user, as they effectively assist the user's learning without being overwhelming.

IDEaL - calm, supportive, educational

Colors

Dark Mode

Primary

Secondary

Light Mode

Primary

Secondary

Icons

example syntax “sticky notes”

For Loops (By Range)

```
for (int i = 0; i < 5; i++) {
    // something with i
}
```

For-Each Loops

```
for (char c: str) {
    // something with c
}
```

example error message

! You can’t do *A* with *B*. Try checking *C* or review recursion.

Textures

Inter / Inter	for notes, text
Fira Code	for the code
Ledger	for learning

Fonts

Look and Feel Prototype Demo

and Regular Figma

Design Justification

Design

Looking to popular IDEs with a slick look such as VSCode and Sublime, we stuck with a simplistic IDE layout with just the basics on the screen to start with: the file you're in, the code you're writing, the line numbers, and the buttons you need to make stuff run.

We also used popular learning companies such as Khan Academy or Duolingo to motivate our color selection in our style tile, ultimately opting for a mostly black/white/gray/blue palette with touches of green and yellow.

In an IDE, seeing errors is the most important thing, and we didn't want too much color to take away from that. Thus, most of the screen is dark gray / white depending on the user's selection of "dark mode" or "light mode."

Product Branding

Since the learning-focus is what sets us apart from other IDEs, it made sense to heavily emphasize this in our branding: from the product name to what to put on the loading screen as the app was firing up to how we will brand ourselves in pursuit of customers.

Implementation Prototype Demo

Tech Stack: TypeScript, VSCode Extension API, Python, Shell scripting

Justification:
Our spike prototype showcases a key feature of our product - automated error message translation. As an MVP, we created a VSCode extension with this component of our idea, leveraging the VSCode Extension API to demonstrate feasibility of our spike feature alone rather than a full standalone IDE. The extension detects any errors in student-written Python code and presents the user with a simple, understandable version of this error with debugging advice for beginner coders.

Implementation Prototype Writeup

- Started by building a CLI tool to parse error messages into simpler, more readable messages
  - Focus on 3-4 of the most common Python/C++ error messages to start
- Take CLI tool and package into a VSCode extension
- Use HTML and CSS to add graphics to make the popup more engaging
- Test in development environment to make sure specific error messages are being parsed correctly

Go-To Market Plan

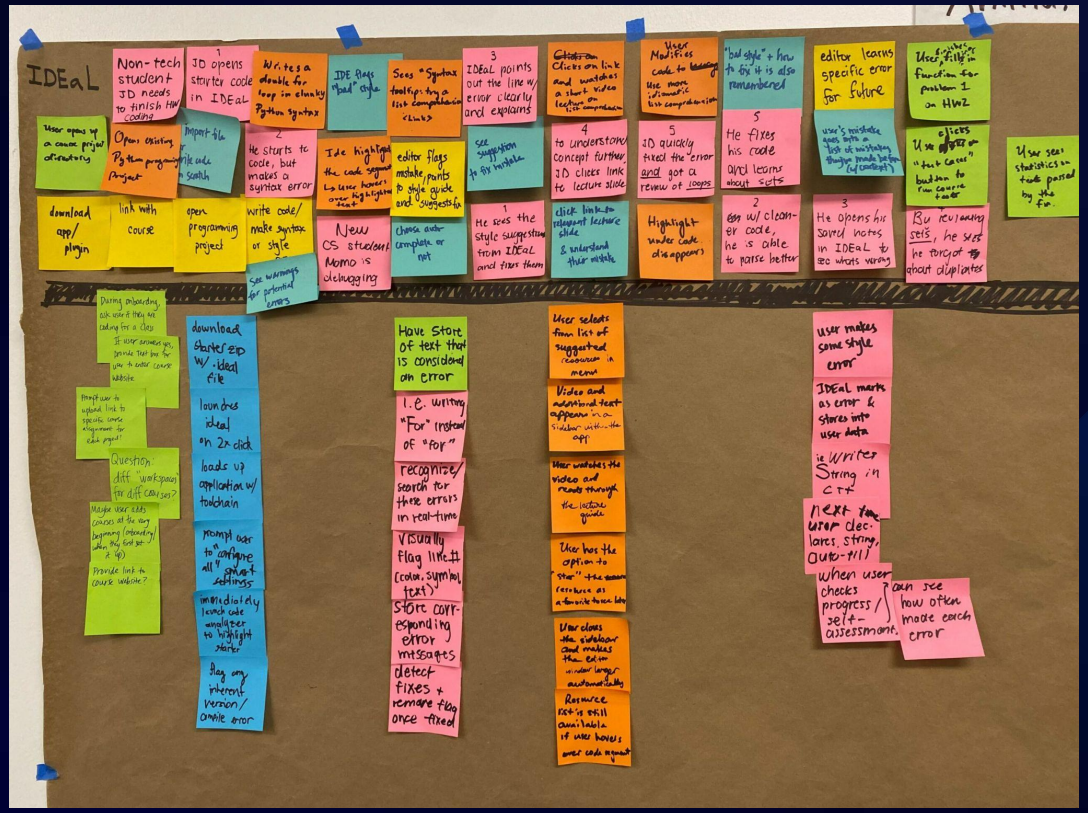
MVP

- Simple, working IDE with the following learning-friendly features:
  - Error messages with "plain English," beginner-friendly wording
  - On-the-fly style tips so you can improve style as you're coding
  - A place to review conceptual material
  - A way to keep "sticky notes" for key learnings

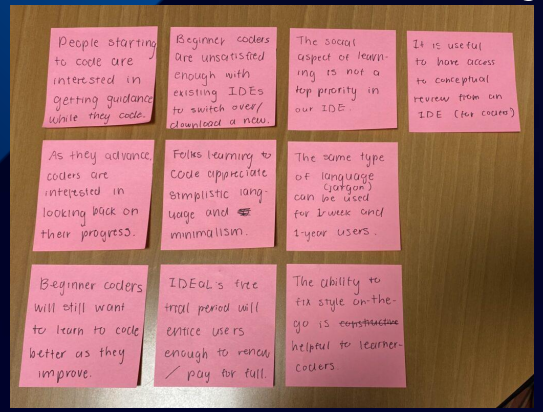
Customers, Customers, Customers!

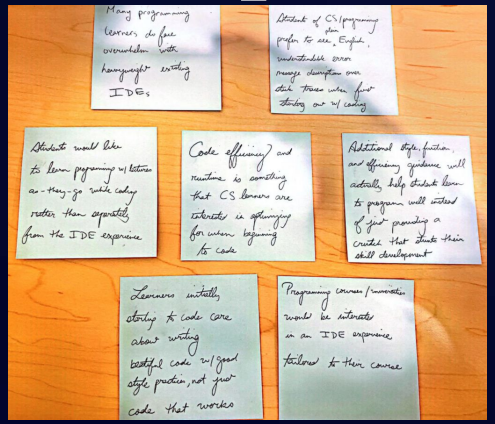
- We will build strong, feedback-friendly relationships with our starting partnership (Stanford CS program) to build up our reputation
  - As we expand, get connections from faculty members
- Student and faculty word-of-mouth
- Converting customers: discuss time saved for graders, office hours, students who are frustrated
- Retaining customers:
  - Quarterly check-ins with programs to see what's working / not
  - Expanding team of engineers to ensure high + improving performance

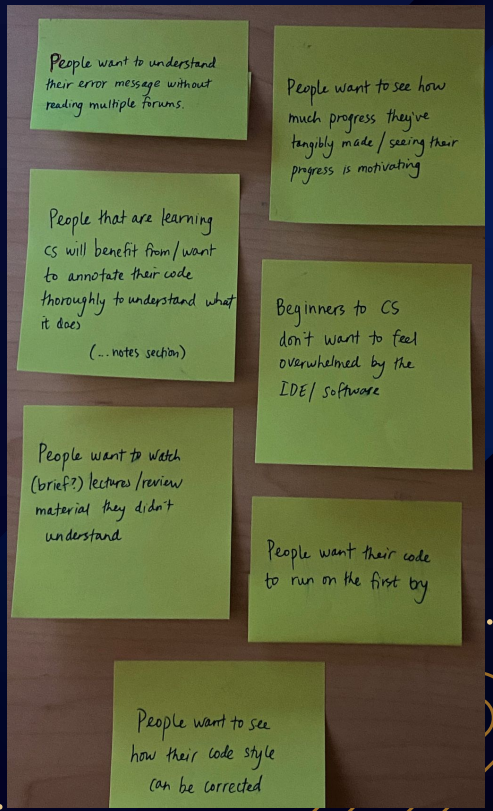
User Story Mapping

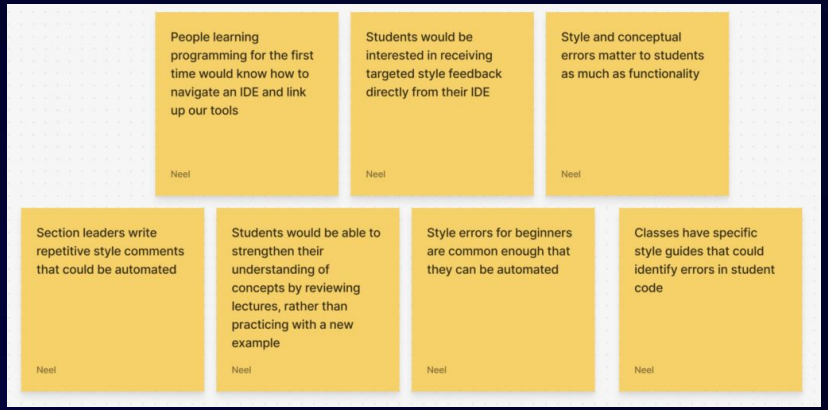


Key Assumptions





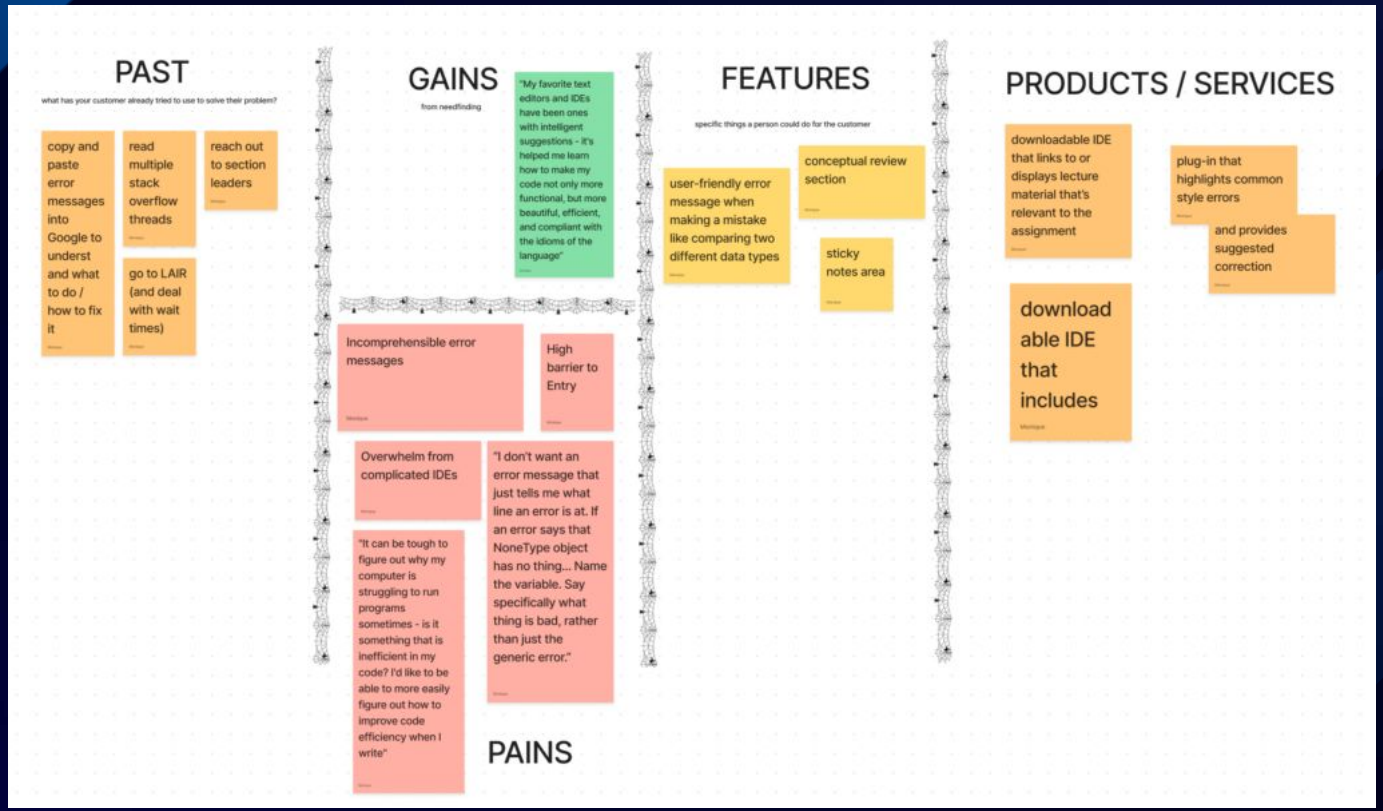




BMC


Resources
Stanford CS198 Community
Developers
Design / UI / UX
STORAGE
GPU
Servers
Partners
Institutions to pilot/test
CS education groups
tech conferences
Legal
outsource
Extensions / Plug-ins
Copyrights / Data
Legal Team / IP
App Publish
Storage
Value
External
Improve code style
Less intimidating experience
Ease Coding
Decrease Staff overhead
Better error messages
Learn-as-you-Go coding
not overwhelming
Lower Barrier to coding
Internal
Get
coherent error messages (not demotivating!)
initially free w/ all the features
Aesthetic Design
Keep
Customers
college CS students
Software Developers
bootcamp students
HS CS Students
people in HCI / CS147 / 177 / etc where coding happens in the last 3 weeks
Tech Interns
Exercises / tutorials built-in
COSTS
Storage
Advertising / Getting users
Labor / Employees
Engineering
Maintenance
Revenue
subscription model
SAAS!
Free Trial ↓ Premium

VPC


PAST
what has your customer already tried to use to solve their problem?
copy and paste error messages into Google to underst and what to do / how to fix it
read multiple stack overflow threads
reach out to section leaders
go to LAIR (and deal with wait times)
GAINS
from needfinding
"My favorite text editors and IDEs have been ones with intelligent suggestions - it's helped me learn how to make my code not only more functional, but more beautiful, efficient, and compliant with the idioms of the language"
FEATURES
specific things a person could do for the customer
user-friendly error message when making a mistake like comparing two different data types
conceptual review section
sticky notes area
PRODUCTS / SERVICES
downloadable IDE that links to or displays lecture material that's relevant to the assignment
plug-in that highlights common style errors
and provides suggested correction
download able IDE that includes
Incomprehensible error messages
High barrier to Entry
Overwhelm from complicated IDEs
"I don't want an error message that just tells me what line an error is at. If an error says that NoneType object has no thing... Name the variable. Say specifically what thing is bad, rather than just the generic error."
"It can be tough to figure out why my computer is struggling to run programs sometimes - is it something that is inefficient in my code? I'd like to be able to more easily figure out how to improve code efficiency when I write"
PAINS

All Tests/Interviews

By Team Member Conducted:

Jin-Hee + Monique:
- Priority testing with 2 individuals: Sanjay, Victoria
- Experience prototype tests with 6 individuals: Natalie, Tom, Sarah, Mason, Sam, Andrew

Jin-Hee:
- Needfinding interviews with 5 individuals: Momo, Michael, JD, Isabelle, Grant

Monique:
- Needfinding interviews with 5 individuals: Arthur, Sarah, Brian, Zoe, Claire

Neel:
- Needfinding interviews with 4 individuals: Julie, Cynthia, Lucia, Tobey
- Experience prototype testing with 2 individuals: Danny, Andrea

Amrita:
- Needfinding interviews with 4 individuals: Sumer, Megan, Anisha, Catherine

Thank you!