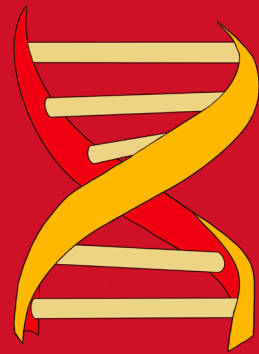




IOWA STATE UNIVERSITY

Genome Informatics Facility



From Chatbot to Builder: Turning AI Into a Daily Collaborator Inside Real Projects

Andrew Severin
Genome Informatics Facility
Iowa State University

451 Bessey Hall
Iowa State University



Genome Informatics Facility

- Serve as a centralized resource of expertise
- Utilize bioinformatic tools to transform 'big data' into informative data that dramatically accelerates our understanding of biology and evolutionary processes.
- Pivoting to AI related tools to enable researchers to accelerate scientific discovery



Chatbots

Prompting:

The process of asking an LLM a question and getting back generated text

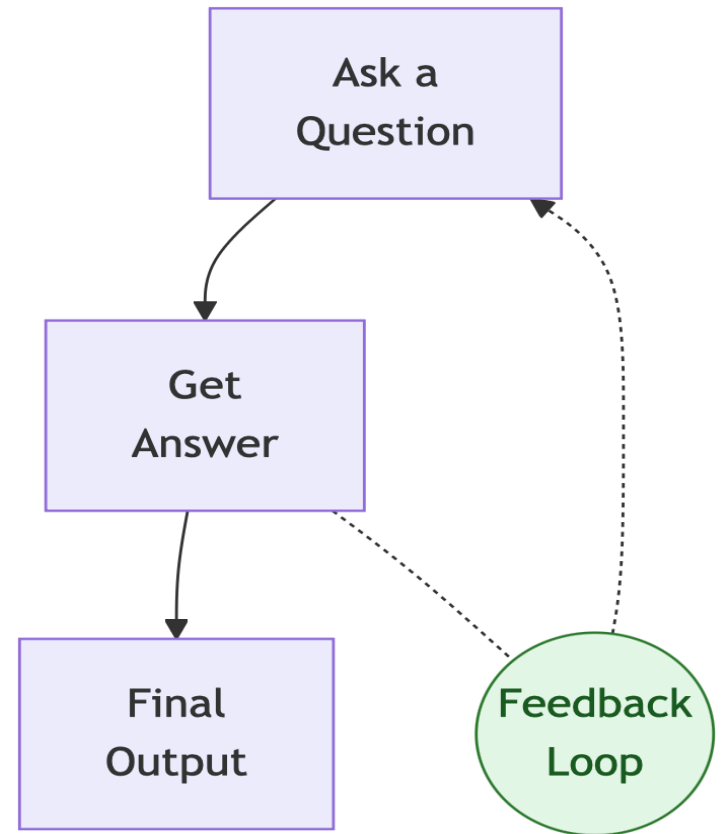
ChatGPT ▾

What's on your mind today?

+ Ask anything



Organization knowledge





Chatting with your documents

- VSCode is a markdown editor
 - Folder
 - Markdown Text
 - Markdown Viewer
 - LLM plugin support
- Converts a folder into a Retrieval-Augmented Generation (RAG) system
- Agents (Codex/Claude Code) can create and modify documents.



Visual Studio Code

Folder/Files

Markdown Text

Markdown Viewer

The screenshot displays the Visual Studio Code interface with three main panels:

- EXPLORER (Left):** Shows the file structure of the 'bioinformaticsworkbookV3' workspace. The 'Day9' folder is selected, containing files like '91_github_intro_cmd.md', '92_markdown_github_cmd.md', '93_vscode_install_cmd.md', '94_git_workflow_cmd.md', '95_wrap_up_cmd.md', and 'README.md'. The 'SEARCH' panel at the bottom shows results for the term 'glossary'.
- Editor (Middle):** Displays the content of '91_github_intro_cmd.md'. The text includes a heading '# GitHub: Your Online Lab Notebook' and several paragraphs explaining the purpose of GitHub and how to create an account. Line numbers 31 through 55 are visible on the left margin.
- Preview (Right):** Shows a rendered view of the markdown document. It features a heading 'GitHub: Your Online Lab Notebook' and paragraphs of text. A bulleted list under the heading 'Bioinformaticians use GitHub to:' includes: 'Keep a reproducible record of every command they ran', 'Back up code and notes offsite', 'Share methods with collaborators or reviewers', and 'Version-control scripts so mistakes can be undone'. Below this, a section titled 'Create a GitHub Account' lists steps: '1. Go to github.com', '2. Click **Sign up**', and '3. Enter your email, create a password, and choose a username'.



LLM Plugin Support

Agent

Markdown Text

Markdown Viewer

The screenshot displays the Claude AI interface. On the left, a chat window shows a conversation where the user asks if GitHub can be added to a glossary. The AI responds with a plan to add it. The central pane shows a preview of a GitHub README file titled "100 Days (MacOS) Day 9.1". The right-hand sidebar contains a section titled "GitHub: Your Online Lab Notebook" with text explaining the purpose of GitHub for bioinformatics and a list of steps to create a GitHub account and repository.

GitHub: Your Online Lab Notebook

For the past eight days you have been running bioinformatics analyses from the command line. You have scripts, results files, and notes — but where are they stored? If your laptop dies tomorrow, is your work recoverable? Can a colleague reproduce what you did?

This is the problem GitHub solves. Today you will create a GitHub account, make your first repository, and edit a file directly in the browser. On Day 9.3 you will connect GitHub to your local computer so edits flow seamlessly in both directions.

What is GitHub?

GitHub is a website that stores Git repositories online. A **repository** (repo) is a folder whose entire history of changes is tracked. Every time you save a change (called a **commit**), Git records what changed, when, and why.

Bioinformaticians use GitHub to:

- Keep a reproducible record of every command they ran
- Back up code and notes offsite
- Share methods with collaborators or reviewers
- Version-control scripts so mistakes can be undone

Think of it as a combination of Dropbox (offsite backup), a lab notebook (dated record of work), and a track-changes document (full history of every edit).

Create a GitHub Account

1. Go to [github.com](#)
2. Click **Sign up**
3. Enter your email, create a password, and choose a username
 - Use a professional username — it will appear on your published work
4. Verify your account via email
5. Choose the **Free** plan (unlimited public and private repos)

As a researcher or educator you can later request a free upgrade for private repos with unlimited collaborators at [github.com/education](#).

Create Your First Repository

A repository is the container for one project. Think of it like a project folder.

1. Click the + icon in the top-right corner → **New repository** (Alternatively, click on the green **New** or **New Repository** button on your Dashboard or Repositories page)
2. Fill in the fields:
 - **Repository name:** `100days-bioinformatics` (use hyphens, not spaces)
 - **Description:** "My notes and scripts from the 100 Days of Bioinformatics"
 - **Visibility:** Public (or Private — your choice)
 - Check **Add a README file** — this creates the first file automatically
3. Click **Create repository**

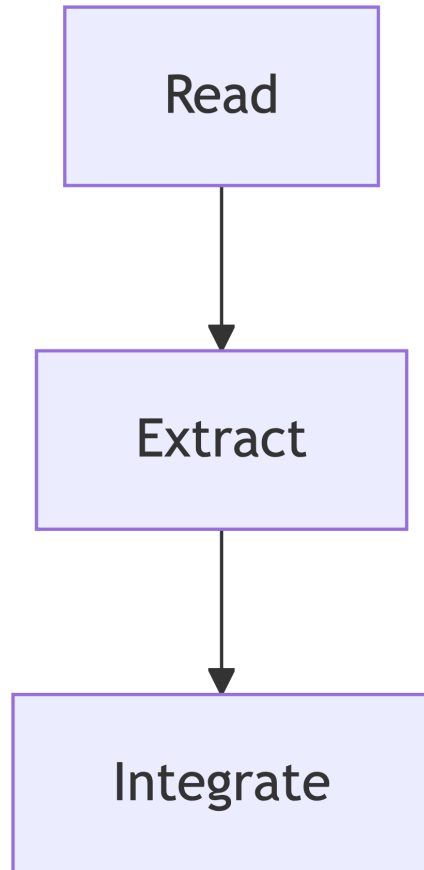


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andrewseverin.bsky.social



Chatbots + LLM curated knowledge bases



Andrej Karpathy LLM Wiki idea

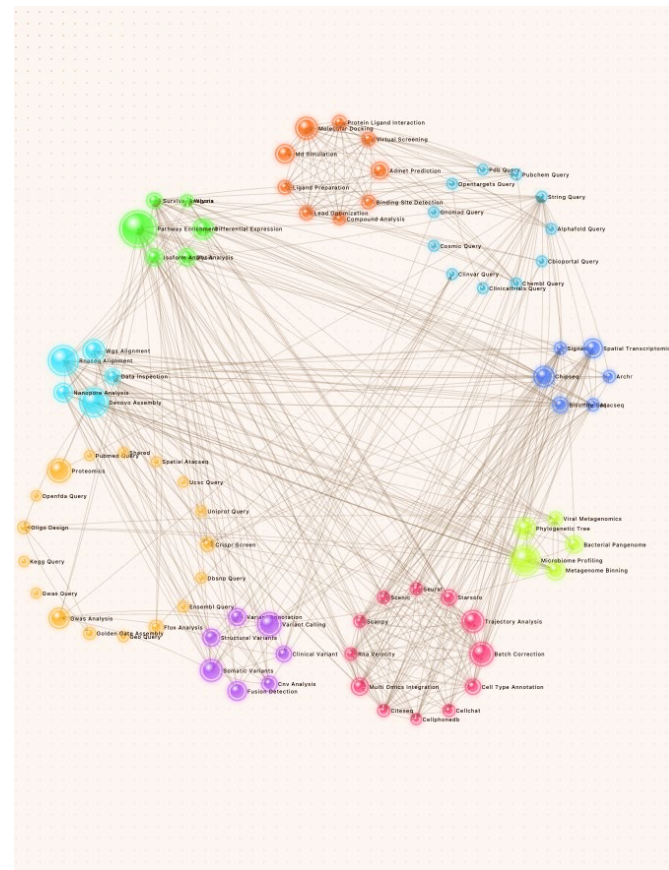
- New pages are created
- Existing pages updated
- Contradictions Flagged
- Cross referenced entities

Creates the Wiki automatically



Challenges to LLM + Wiki

- Calibration of extraction pipelines
- Error handling and propagation control
- Contradiction detection and resolution
- Scalability and knowledge base management



Skills: prompts with computer access

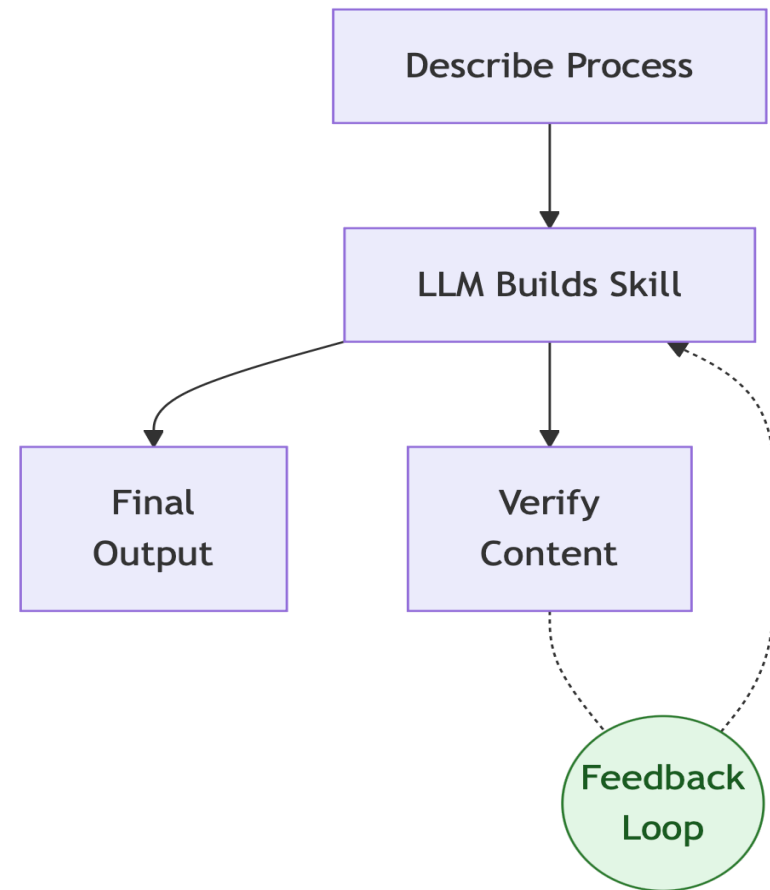
- Are executed by Agents
 - ChatGPT is a chat agent with skills for
 - Web search
 - File ingestion
 - Image generation
 - And more
 - Codex and Claude Code are a coding agent
 - Code execution
 - Execute commands
 - Edit files





Skill Building: Human in the feedback-loop

- Prompts with code execution
- Can be used to generate reports
 - Local sources
 - Web searches
- Generate content
 - Social media campaign
 - Documentation
 - etc.



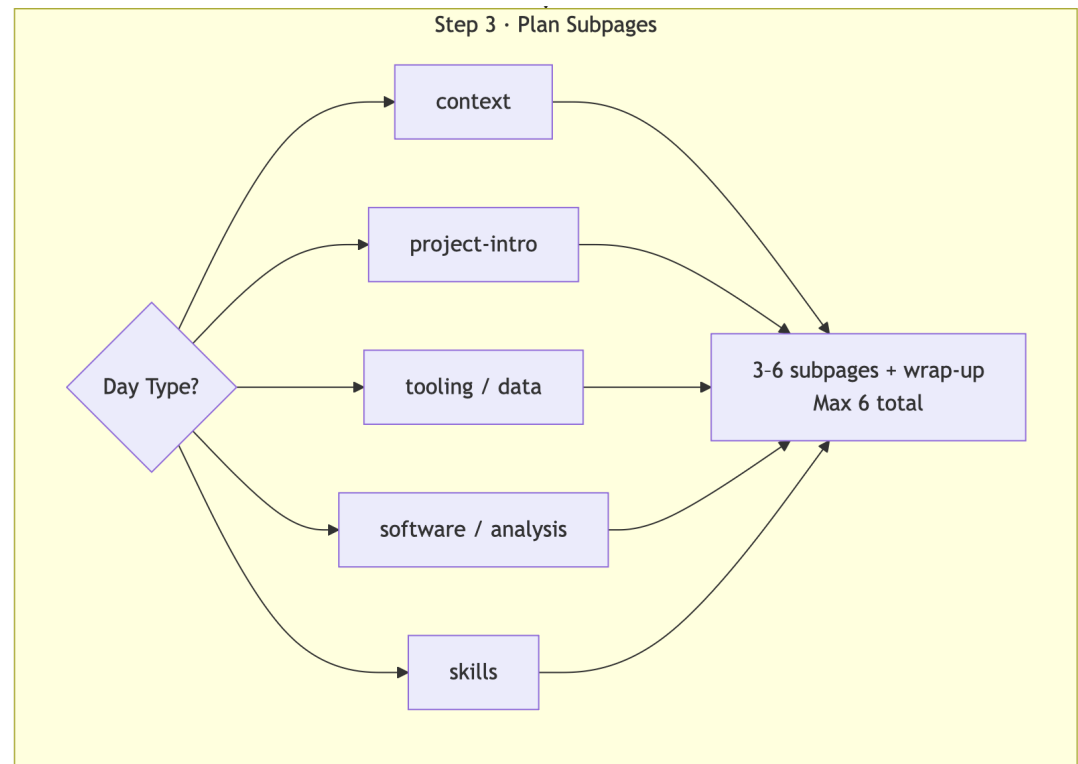
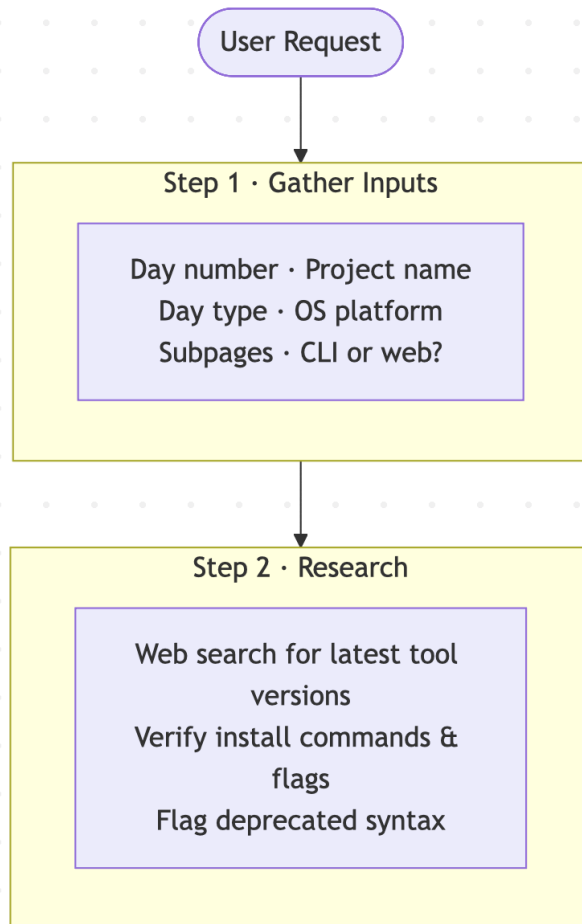


Skill Example: Create a tutorial

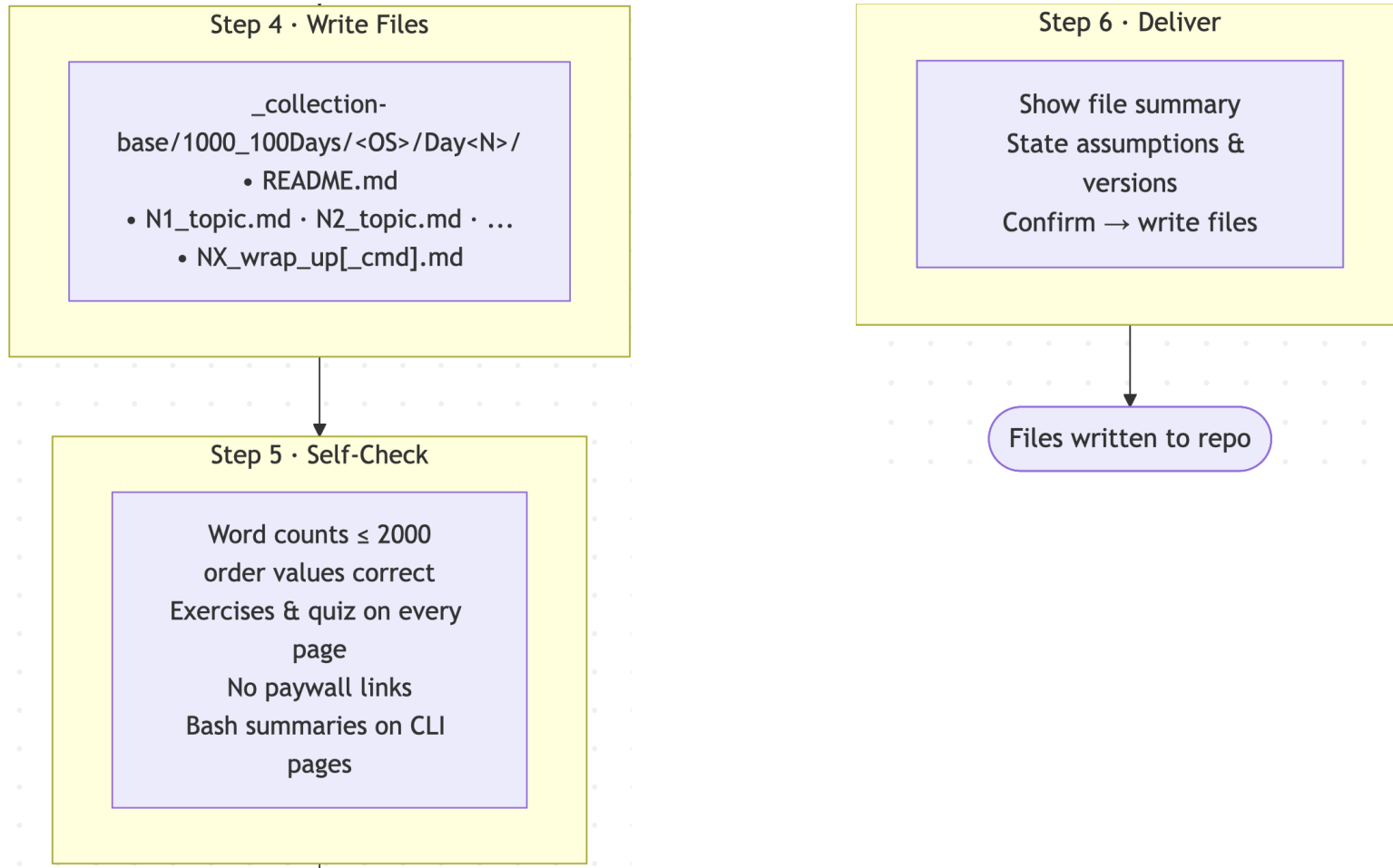
- Create a folder with bioinformatics content for 4-6 files
- Contains yaml front matter that changes
- Tight specifications depending on type of content requested
- No more than 2000 words per page
- Do a web search first for latest content



Skill Example: Create a tutorial



Skill Example: Create a tutorial



Skill Example

The screenshot displays a VS Code editor window with a file explorer on the left showing a project structure for 'BIOINFORMATICSWORKBOOKV3'. The main editor shows a file named '91_github_intro_cmd.md' with a YAML frontmatter block and a list of questions. A preview window on the right shows the rendered version of this file, titled 'GitHub: Your Online Lab Notebook', which contains a paragraph about the problem GitHub solves, a list of questions, and a section titled 'What is GitHub?'. The bottom status bar shows the file path 'fix/mdd-audit-2026-04-16*' and a message 'Update is ready, click to restart.'

GitHub: Your Online Lab Notebook

For the past eight days you have been running bioinformatics analyses from the command line. You have scripts, results files, and notes — but where are they stored? If your laptop dies tomorrow, is your work recoverable? Can a colleague reproduce what you did?

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Bioinformaticians use GitHub to:

- Keep a reproducible record of every command they ran
- Back up code and notes offsite
- Share methods with collaborators or reviewers
- Version-control scripts so mistakes can be undone

Think of it as a combination of Dropbox (offsite backup), a lab notebook (dated record of work), and a track-changes document (full history of every edit).

Create a GitHub Account

1. Go to github.com
2. Click **Sign up**
3. Enter your email, create a password, and choose a username
 - Use a professional username — it will appear on your published work
4. Verify your account via email
5. Choose the **Free** plan (unlimited public and private repos)

As a researcher or educator you can later request a free upgrade for private repos with unlimited collaborators at github.com/education.

Create Your First Repository

A repository is the container for one project. Think of it like a project folder.

1. Click the + icon in the top-right corner → **New repository** (Alternatively, click on the green **New** or **New Repository** button on your Dashboard or Repositories page)
2. Fill in the fields:
 - **Repository name:** `100days-bioinformatics` (use hyphens, not spaces)



Skill Example

EXPLORER

BIOINFORMATICSWORKBOOKV3

- collection-base/1 bioinformaticsworkbookV3
- MACOS
 - 00_NewDays
 - assets
 - Day0
 - Day1
 - Day2
 - Day3
 - Day4
 - Day5
 - Day6
 - Day7
 - Day8
 - Day9
 - 91_github_intro_cmd.md 7, U
 - 92_markdown_github_cmd.md U
 - 93_vscode_install_cmd.md U
 - 94_git_workflow_cmd.md U
 - 95_wrap_up_cmd.md U
 - README.md U
 - Day10
 - 101_intro_project_management_cmd.md U
 - 102_documentation_note_block_cmd.md 8, U
 - 103_github_vscode_integration_cmd.md U
 - 104_blast_project_documentation_cmd.md U
 - 105_wrap_up_cmd.md U
 - README.md U
- old
- ReviewDays
- 00_index.md
- index.md
- WINDOWS
 - Ideas.md
- _data
- _includes
 - analytics-providers
 - bio-data
 - bio-databases
 - bio-plots
 - bio-tools
 - citations
 - comments-provider
- OUTLINE
- TIMELINE
- SEARCH

```

collection-base > 1000_100Days > MACOS > Day9 > 91_github_intro_cmd.md > ...
5 oneword: "Mac05_day9_1"
6 day: 9
7 date: 2026-04-16
8 info_author: "Andrew Severin"
9 initial_release: "2026"
10 header:
11   overlay_color: "444"
12   overlay_image: ./../
13   tags: [macos, github,
14   attributes: {}
15   type: "100days"
16   order: 1091
17   level: 2
18   questions:
19     - question: "What is
20       options:
21         - "Running BLAST"
22         - "Version-control"
23         - "Storing raw
24         - "Visualizing
25       correct: 2
26   additional_resources:
27     - title: "GitHub Quick
28       link: "https://do
29
30 ---
31 # GitHub: Your Online
32
33 For the past eight days
34 command line. You have
35 stored? If your laptop
36 reproduce what you did
37
38 This is the problem G
39 first repository, and
40 connect GitHub to you
41
42 ## What is GitHub?
43
44 GitHub is a website th
45 a folder whose entire
46 (called a **commit**).
47
48 Bioinformatics users
49 - Keep a reproducible
50 - Back up code and
51 - Share methods with
52 - Version-control scripts so mistakes can be undone
53
54 Think of it as a combination of Dropbox (offsite backup), a lab notebook (dated
55 record of work), and a track-changes document (full history of every edit).
56
57 ## Create a GitHub Account
58
59
60

```

Preview 91_github_intro_cmd.md

GitHub: Your Online Lab Notebook

For the past eight days you have been running bioinformatics analyses from the command line. You have

are they stored? If your laptop dies tomorrow, is your work you did?

will create a GitHub account, make your first repository, .3 you will connect GitHub to your local computer so edits

online. A **repository** (repo) is a folder whose entire ave a change (called a **commit**), Git records what

command they ran

fewers

be undone

backup), a lab notebook (dated record of work), and a edit).

choose a username

will appear on your published work

and private repos)

est a free upgrade for private repos with unlimited

A repository is the container for one project. Think of it like a project folder.

- Click the + icon in the top-right corner → **New repository** (Alternatively, click on the green **New** or **New Repository** button on your Dashboard or Repositories page)
- Fill in the fields:
 - Repository name:** 100days-bioinformatics (use hyphens, not spaces)

R: (not attached)



Agents

- Skills with separate context windows
- When you are in the middle of a process and need the answer to a question but the process to get that answer would create a bunch of unnecessary context polluting your main context window then you need a subagent.



One-off Software Development: Problem

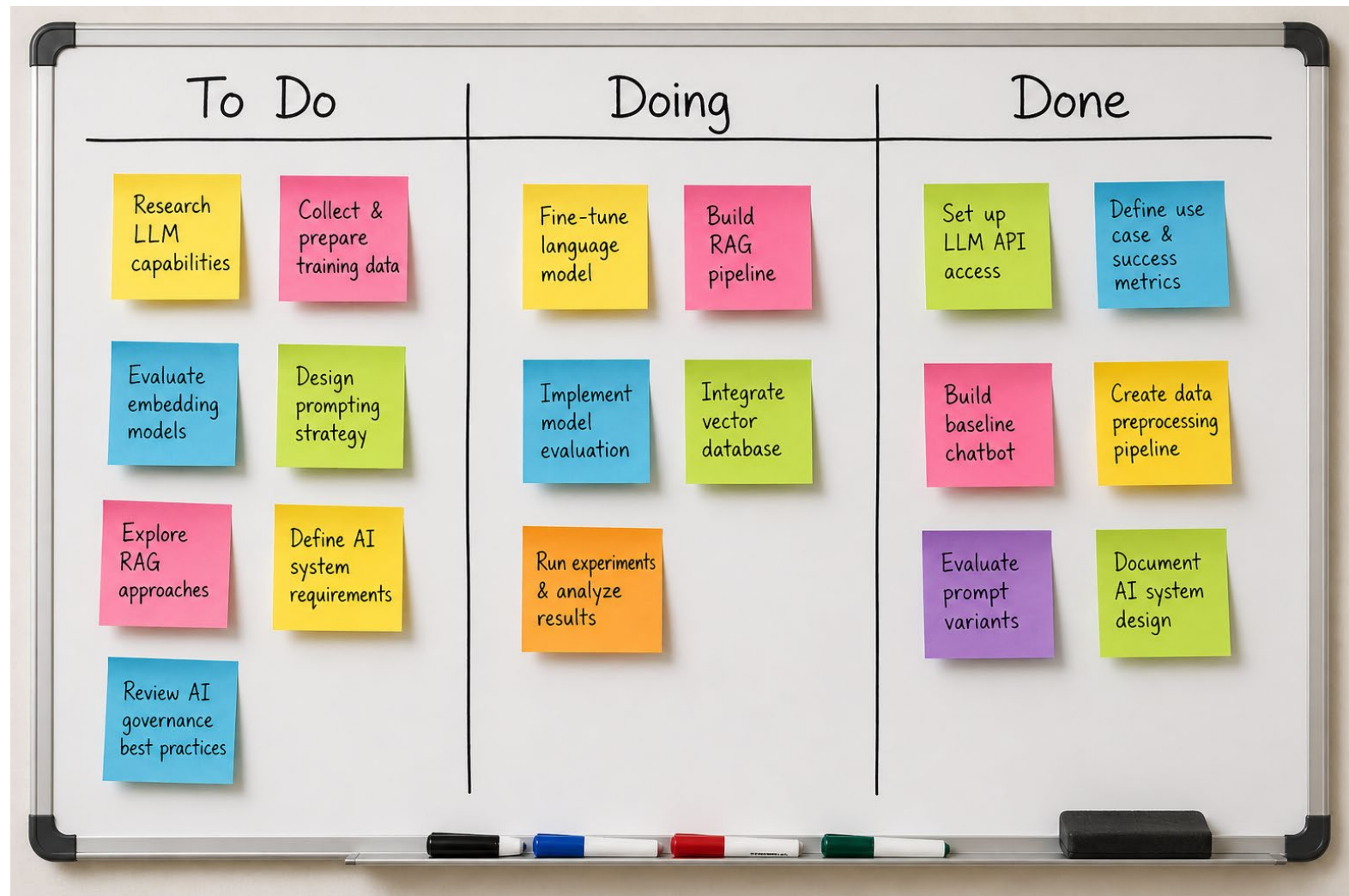
- Coding is no longer a barrier
- Think bigger

Problem:

I was using a kanban board to keep track of my projects but the company of a tool I was using decided to start charging a monthly service fee per user. So, I wrote my own with the help of LLMs.



What is a Kanban Board?



One-off Software Development: Solution

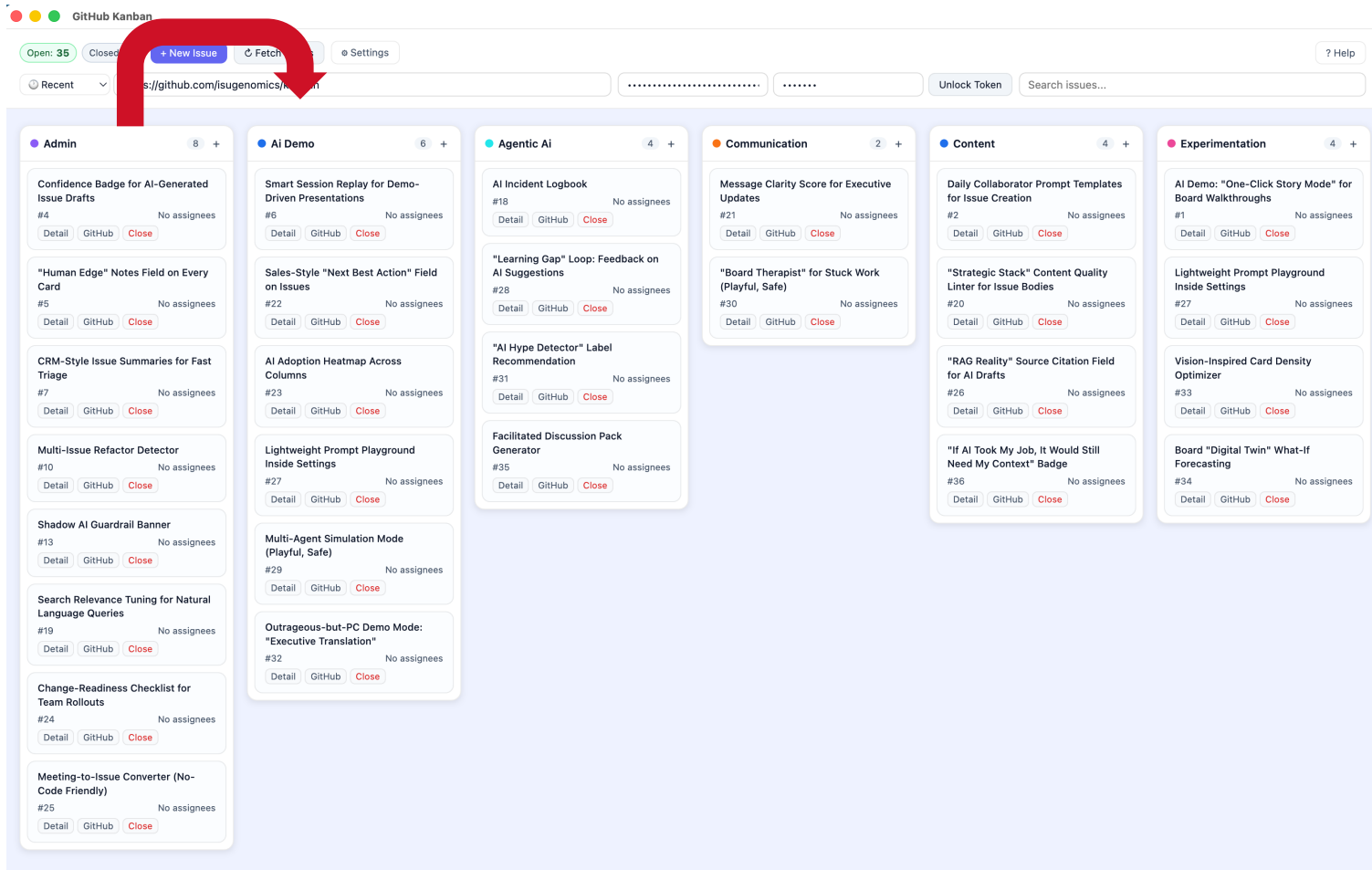
- Chrome Plugin
- OS independent
- What the software I was using used to be before they centralized and started charging.
- Done using ChatGPT in 2023 before coding agents



<https://github.com/ISUgenomics/kanban>



One-off Software Development



One-off Software Development

GitHub Kanban

Open: 35 Closed: 2 + New Issue Fetch Issues Settings ? Help

Recent https://github.com/isugenomics/kanban Unlock Token Search issues...

AI Demo 6 +

Smart Session Replay for Demo-Driven Presentations

#6 No assignees

Detail GitHub Close

Sales-Style "Next Best Action" Field on Issues

#22 No assignees

Detail GitHub Close

AI Adoption Heatmap Across Columns

#23 No assignees

Detail GitHub Close

Lightweight Prompt Playground Inside Settings

#27 No assignees

Detail GitHub Close

Multi-Agent Simulation Mode (Playful, Safe)

#29 No assignees

Detail GitHub Close

Outrageous-but-PC Demo Mode: "Executive Translation"

#32 No assignees

Detail GitHub Close

Admin 8 +

Confidence Badge for AI-Generated Issue Drafts

#4 No assignees

Detail GitHub Close

"Human Edge" Notes Field on Every Card

#5 No assignees

Detail GitHub Close

CRM-Style Issue Summaries for Fast Triage

#7 No assignees

Detail GitHub Close

Multi-Issue Refactor Detector

#10 No assignees

Detail GitHub Close

Shadow AI Guardrail Banner

#13 No assignees

Detail GitHub Close

Search Relevance Tuning for Natural Language Queries

#19 No assignees

Detail GitHub Close

Change-Readiness Checklist for Team Rollouts

#24 No assignees

Detail GitHub Close

Meeting-to-Issue Converter (No-Code Friendly)

#25 No assignees

Detail GitHub Close

Agentic AI 4 +

AI Incident Logbook

#18 No assignees

Detail GitHub Close

"Learning Gap" Loop: Feedback on AI Suggestions

#28 No assignees

Detail GitHub Close

"AI Hype Detector" Label Recommendation

#31 No assignees

Detail GitHub Close

Facilitated Discussion Pack Generator

#35 No assignees

Detail GitHub Close

Communication 2 +

Message Clarity Score for Executive Updates

#21 No assignees

Detail GitHub Close

"Board Therapist" for Stuck Work (Playful, Safe)

#30 No assignees

Detail GitHub Close

Content 4 +

Daily Collaborator Prompt Templates for Issue Creation

#2 No assignees

Detail GitHub Close

"Strategic Stack" Content Quality Linter for Issue Bodies

#20 No assignees

Detail GitHub Close

"RAG Reality" Source Citation Field for AI Drafts

#26 No assignees

Detail GitHub Close

"If AI Took My Job, It Would Still Need My Context" Badge

#36 No assignees

Detail GitHub Close

Experimentation 4 +

AI Demo: "One-Click Story Mode" for Board Walkthroughs

#1 No assignees

Detail GitHub Close

Lightweight Prompt Playground Inside Settings

#27 No assignees

Detail GitHub Close

Vision-Inspired Card Density Optimizer

#33 No assignees

Detail GitHub Close

Board "Digital Twin" What-If Forecasting

#34 No assignees

Detail GitHub Close



One-off Software Development

GitHub Kanban

Open: 35 Closed: 2 + New Issue Fetch Issues Settings ? Help

Recent https://github.com/isugenomics/kanban

Unlock Token Search Issues...

Ai Demo 6 +

- Smart Session Replay for Demo-Driven Presentations #6 No assignees
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Detail GitHub Close
- Outrageous-but-PC Demo Mode: "Executive Translation" #32 No assignees
Detail GitHub Close

Admin 7 +

- "Human Edge" Notes Field on Every Card #5 No assignees
Detail GitHub Close
- CRM-Style Issue Summaries for Fast Triage #7 No assignees
Detail GitHub Close
- Multi-Issue Refactor Detector #10 No assignees
Detail GitHub Close
- Shadow AI Guardrail Banner #13 No assignees
Detail GitHub Close
- Search Relevance Tuning for Natural Language Queries #19 No assignees
Detail GitHub Close
- Change-Readiness Checklist for Team Rollouts #24 No assignees
Detail GitHub Close
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Detail GitHub Close

Agentic AI 5 +

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Detail GitHub Close
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Detail GitHub Close
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Detail GitHub Close
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Detail GitHub Close
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Detail GitHub Close

Communication 2 +

- Message Clarity Score for Executive Updates #21 No assignees
Detail GitHub Close
- "Board Therapist" for Stuck Work (Playful, Safe) #30 No assignees
Detail GitHub Close

Content 4 +

- Daily Collaborator Prompt Templates for Issue Creation #2 No assignees
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- "Strategic Stack" Content Quality Linter for Issue Bodies #20 No assignees
Detail GitHub Close
- "RAG Reality" Source Citation Field for AI Drafts #26 No assignees
Detail GitHub Close
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Detail GitHub Close

Experimentation 4 +

- AI Demo: "One-Click Story Mode" for Board Walkthroughs #1 No assignees
Detail GitHub Close
- Lightweight Prompt Playground Inside Settings #27 No assignees
Detail GitHub Close
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Detail GitHub Close
- Board "Digital Twin" What-If Forecasting #34 No assignees
Detail GitHub Close



Open: 35 Closed: 2 + New Issue Fetch Issues Settings ? Help

Recent https://github.com/isugenomics/kanban

Admin 8 +

- Confidence Badge for AI-Generated Issue Drafts #4 No assignees Detail GitHub Close
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- Outrageous-but-PC Demo Mode: "Executive Translation" #32 No assignees Detail GitHub Close

Agentic AI 4 +

Issue #28 Keyboard Navigation

"Learning Gap" Loop: Feedback on AI Suggestions

Assigned to: No assignees
Opened: 4/22/2026, 12:07:27 PM

[View on GitHub](#)

[Close Issue](#)

Let users rate AI suggestions as useful/not useful so the plugin can tune heuristics and improve recommendation quality over time.

'Definition of done'

- Add thumbs-up/down on suggestions.
- Store feedback signals locally.
- Use feedback to rank future suggestions.

****Suggested Column:**** 'Backlog'

Comments

No follow-up comments on this issue.

Write a follow-up comment

[Post Comment](#)

Communication 2 +

Content 4 +

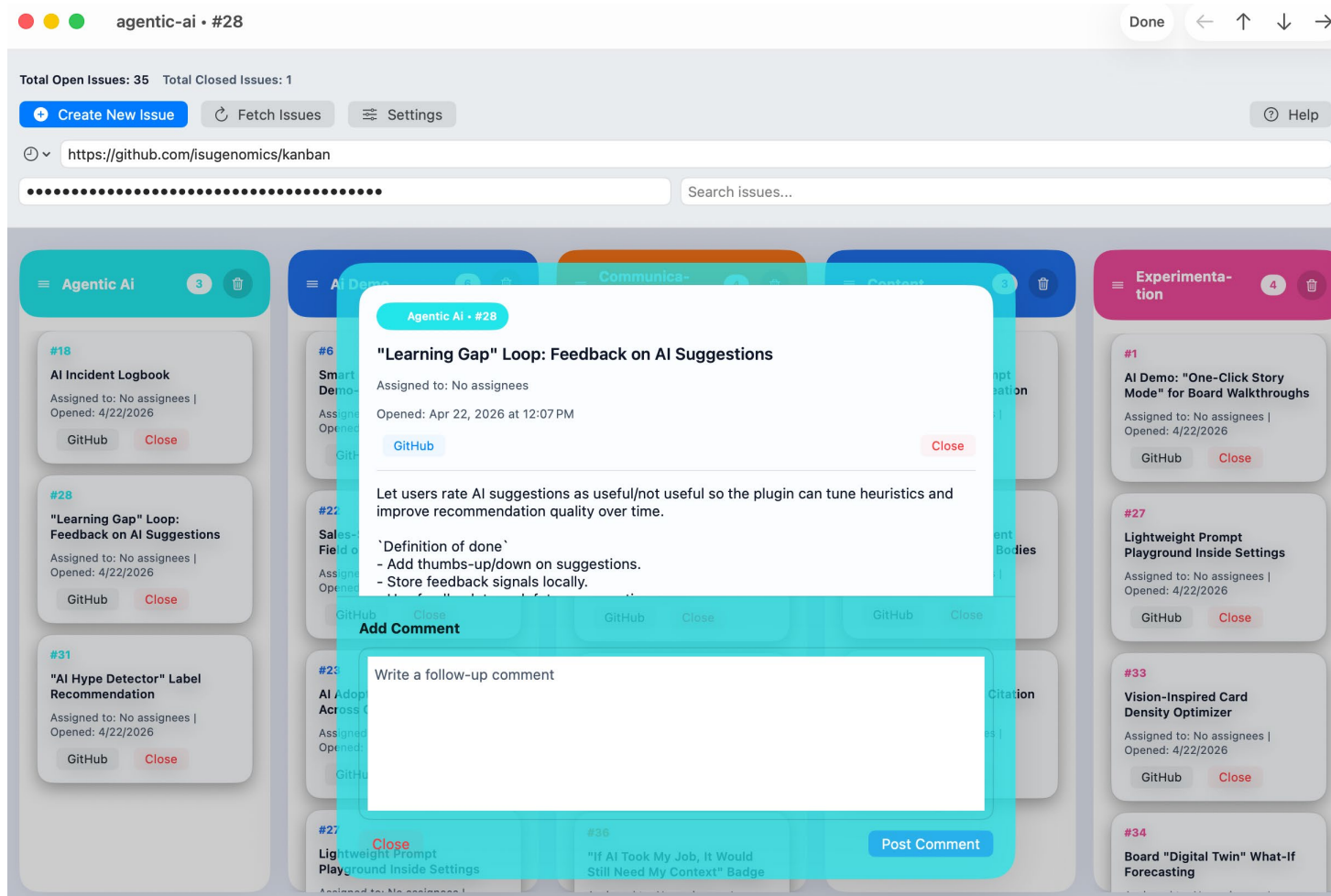
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One-off Software Development: Swift





<https://github.com/ISUgenomics/kanban>







Easy to add Features:

 **Help** 

Getting Started

-  Paste a GitHub repo URL (e.g. <https://github.com/owner/repo>)
-  Enter a Personal Access Token with repo scope
-  Click Fetch Issues or press `⌘↵` to load the board





Board Actions

-  Drag cards between columns to reassign their GitHub label
-  Drag column headers to reorder columns
-  Click + in a column header to create an issue pre-assigned to that column
-  Click any issue card to open its detail view with comments






Easy to add Features:




Issue Detail View

-  Previous issue in the same column
-  Next issue in the same column
-  Move to the previous column
-  Move to the next column
- Esc** Close the detail overlay

Keyboard Shortcuts

-  Fetch / refresh issues
-  Increase column width
-  Decrease column width

Columns & Settings

-  Open Settings to enable/disable columns and sync labels from the repo
-  Each column maps to a GitHub label — dragging a card replaces that label
-  Remove a column from the board (the GitHub label is not deleted)



Translation: 60x faster data processing!

- Data processing went from 15 hours to 15 minutes.
- The value of a digital product is rapidly approaching zero



Phil Ewels Apr 2nd at 11:44 AM

Hi @channel! I'm pretty excited to launch two new projects today: RustQC 🦀 and rewrites.bio 🦄

👉 TLDR: I'm trying to get this to go viral on HackerNews! Please give us a helping hand if you like what you see! 😊 Y <https://news.ycombinator.com/item?id=47616595>

This story started about a month ago, when I jokingly said (not for the first time) that I should just rewrite dupRadar in Rust after seeing it break some #rnaseq runs again. I kicked off Claude together with Seqera AI, and this time it... worked! Fast forward a weekend's worth of building, then several weeks of validation and incremental fixes, and #rustqc was born. It replaces the entire #rnaseq QC subworkflow (dupRadar, featureCounts, 8 RSeQC modules, preseq, samtools stats, and Qualimap) - which together account for over 15 hours of run time. RustQC finishes in around 15 minutes, over 60x faster.





Summary

- **Shift from “Tools” → “Collaborators”:** AI creates value when embedded directly into workflows, not used as standalone chat interfaces
- **Knowledge Becomes a First-Class Asset:** RAG systems transform internal data into continuously updated, self-improving intelligence
- **Software is Becoming Disposable:** The cost of building custom, task-specific tools is collapsing, shifting the build vs buy equation
- **Skills + Agents = Repeatable Automation:** Workflows can be encoded and executed reliably through modular, context-managed agents
- **Efficiency Gains Are Nonlinear:** Automation and translation unlock order-of-magnitude improvements, shifting bottlenecks to problem definition
- **New Constraints Emerge:** Reliability, validation, security and governance become the primary scaling challenges



Final Thoughts:

- AI shouldn't replace your existing workforce
 - **BAD:** I can do the same with fewer people
- AI can multiply my company's output
 - **GOOD:** Give your existing employees AI tools and take your company to a new level of productivity.

Why? Because we need to be **thinking bigger** about what we can accomplish!

