The API Made Me Do It: Do Bad APIs Lead AI to Generate Vulnerable Code?

The API Made Me Do It: Do Bad APIs Lead AI to Generate Vulnerable Code? - Yariv Tal, Secure From Scratch.

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Content

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The API Made Me Do It: Do Bad APIs Lead AI to Generate Vulnerable Code?

Yariv Tal · Secure From Scratch

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Slide 1 (source identifier 1)

The API

Made Me Do It

Do bad APIs lead AI to generate vulnerable code?

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Slide 2 (source identifier 2)

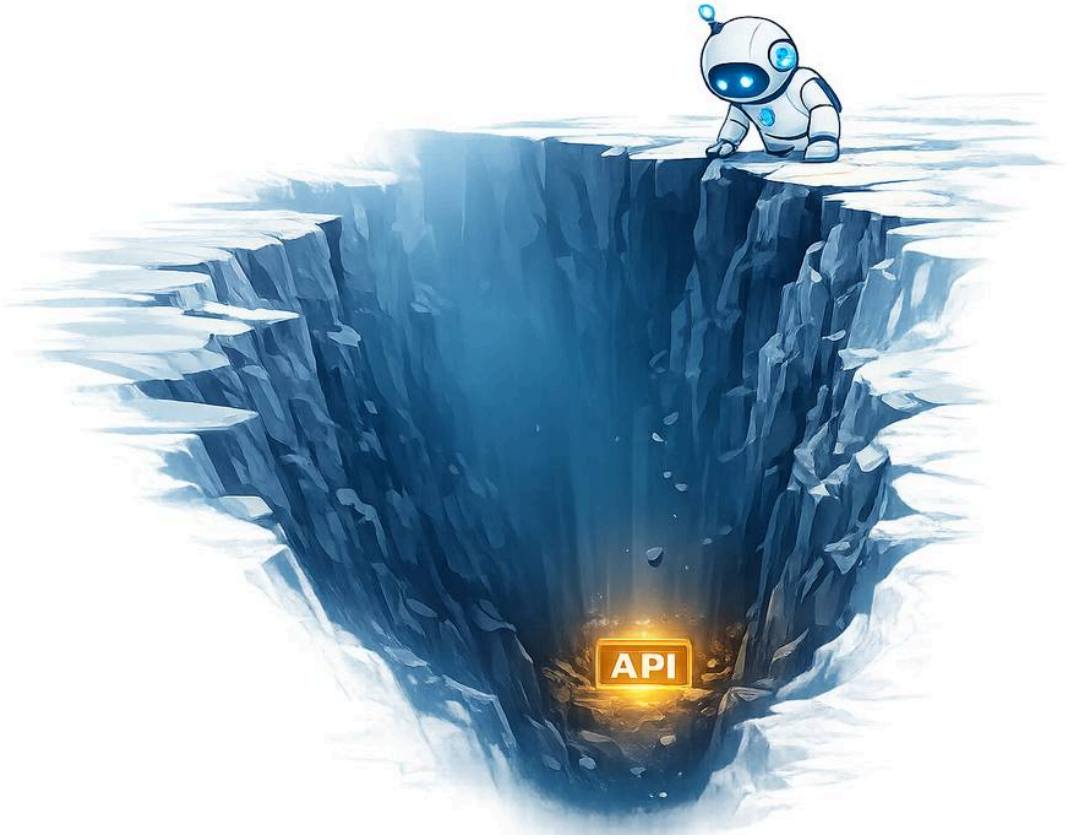
Current APIs

are abysmal!

They lead humans to make mistakes.

Of *course* GenAI will make mistakes too.

The API surface is part of the threat model.



Slide 3 (source identifier 3)

C's open()

```
int fd = open(user_path,
        O_CREAT | O_TRUNC, 0644);
```

- Direct OS call
- Any legal path
- Relative or absolute
- Spurious traversal: a/b/../c/d/../e

insane?

Security by the OS, with current user's permissions.

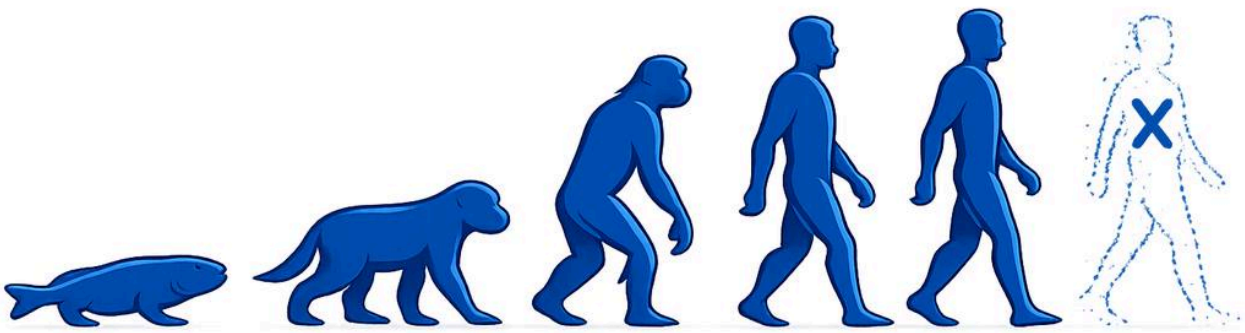
Slide 4 (source identifier 4)

Most APIs never evolved

```
~int fd = open(user_path,~
          ~O_CREAT | O_TRUNC, 0644);~
Path path = Paths.get("/srv/busy-b/tasks")
              .resolve(userPath);
Files.writeString(path, contents,
   StandardOpenOption.CREATE,
   StandardOpenOption.TRUNCATE_EXISTING);
```

- Same diseases
- Any legal path
- Relative or absolute
- … still means “climb out”
- The API still gets a path, not intent

Modern language. Old security shape.



Slide 5 (source identifier 5)

The server user is not an OS user

The OS sees

busybee-server

One process. One security context.

```
Path path =
  Paths.get("/srv/busy-b/tasks")
      .resolve(userPath);
Files.writeString(
       path, contents,
       ...);
```

The app sees

Alice. Bob. Admin. Tenant. Team. Task owner.

The app needs

Ownership. Workflow. Business rules. RBAC. ABAC. ASHMAK.

writeString(...) has no sense of applicational user.

Slide 6 (source identifier 6)

Evolve the API.

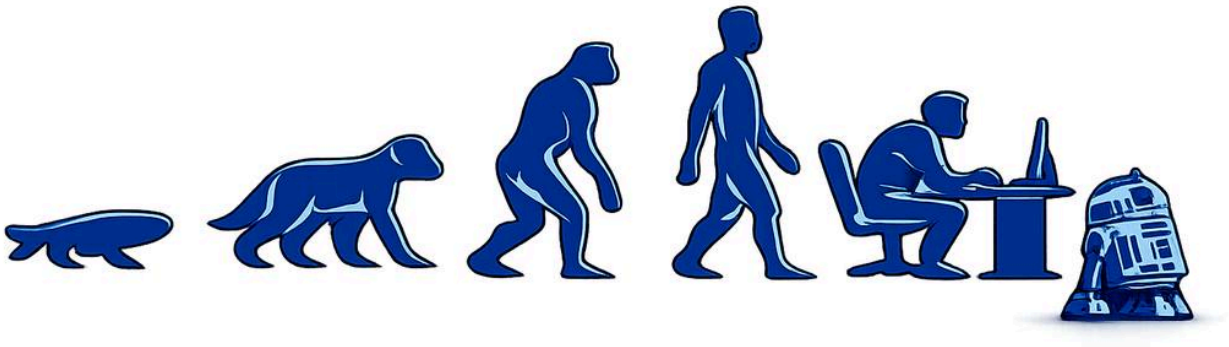
```
~Path path = Paths.get("/srv/busy-b/tasks")~
              ~.resolve(userPath);~
**PathSandbox** taskFiles =
  PathSandbox.boxroot("/srv/busy-b/tasks");
**BoxedPath** *path* =
       taskFiles.resolve(userPath);

Files.writeString(**path**, contents, ...);
```

Source data also includes this complementary code block:

```
PathSandbox taskFiles =
    PathSandbox.boxroot("/srv/busybee/tasks");
BoxedPath target = taskFiles.resolve(userPath);
// file operations happen only after sandbox resolution
```

- Fill in the missing context
- Do not invent a new security model

- Reuse the server's existing authorization logic
- Tell the file API the intended root folder

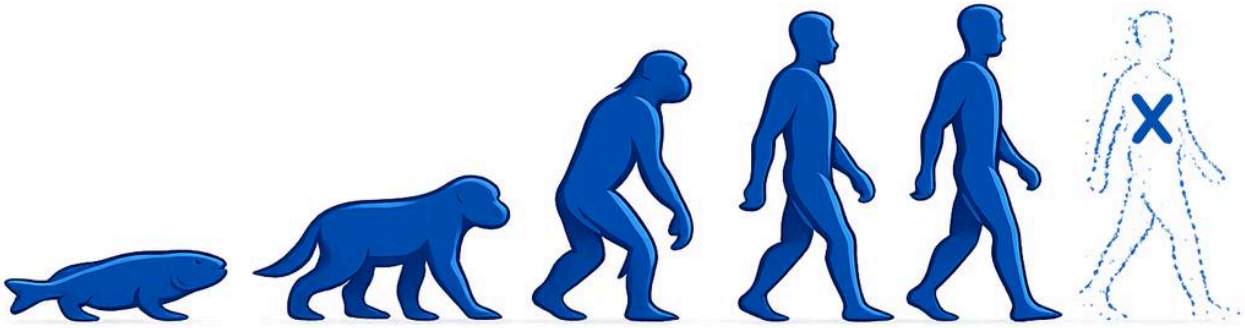


Slide 7 (source identifier 7)

The experiment

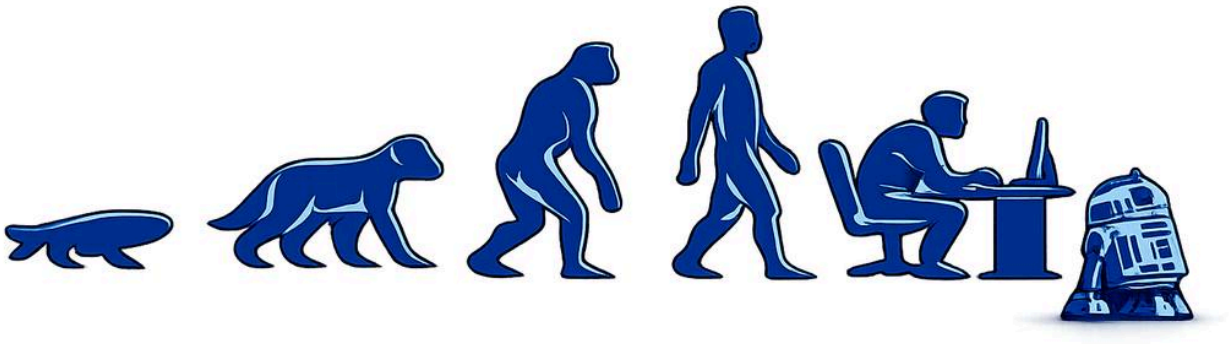
Build 1

Write BusyBee with today's APIs.



Build 2

Write BusyBee with improved APIs.



Same feature target. Same model family. Different API surface.

Slide 8 (source identifier 8)

BusyBee: user-facing app

- User registration and login
- Personal profile and settings
- Create and view tasks
- Assign tasks to users
- Track task status and due dates
- Comments and task activity
- Task attachments
- Import / export tasks
- Link previews
- OCR from uploaded images
- AI summaries for long threads
- User credential storage
- Paid-feature access

Slide 9 (source identifier 9)

Better APIs, How?

Block Bad APIs / Habits

- null
- String composition
- Parameterized Query

- Exception.getMessage

New APIs (OWASP Untrust)

- BoxedPath
- ValidatedValues
- ConstrainedMultipartFile
- ExternalHostHttp

Augment Existing APIs

- Enforce @PreAuthorize
- Global Size Restrictions
- HTTPOnly/SameSize/

Secure

Slide 10 (source identifier 10)

Results: CodeQL

Codex

0

findings

Restricted Codex

2

findings

Missing HttpOnly and Secure.

panic!

Slide 11 (source identifier 11)

Results

Codex

CodeQL: 0

ChatGPT review: 3/10

Restricted Codex

CodeQL: 2

ChatGPT review: 4/10

Biggest missing security: authorization

panic!

Slide 12 (source identifier 12)

Constrain better

Authorization

- Force @PreAuthorize("denyAll()") on controllers
- Force @PreAuthorize("something + ownership test") on methods

OWASP Untrust VV

- Wrap MultipartFile with ConstrainedMultipartFile
- Force explicit bounds selection
- Force external-IP HTTP fetcher

The API must demand the missing security decision.

Slide 13 (source identifier 13)

Results

Before

ChatGPT review: 3/10

After

ChatGPT review: 7/10

Yay!

Slide 14 (source identifier 14)

Conclusion

APIs can steer AI to more secure code

The implementation path changes when unsafe APIs are unavailable.

AI-assisted review beat CodeQL here

It surfaced intent gaps that static analysis did not model.

CodeQL did not reveal

- Authorization failures
- Validation failures
- DoS / resource bounds
- File upload risks
- Download risk / SVG file
- SSRF design gaps
- Prompt injection

SAST is necessary. It is not enough.

Slide 15 (source identifier 15)

Thank you

That was the talk.

Slide 16 (source identifier 16)

Oh, I have some time left

Let's dive in then...

Slide 17 (source identifier 17)

Why I chose Codex

“Choose ChatGPT Plus + Codex for implementing the server.”

— ChatGPT

- Better suited to sustained build-test-fix loops
- Maven / Gradle
- Spring Boot configuration
- integration tests
- database migrations

- multi-module changes
- running and inspecting the application

Use Claude Code as a second opinion for architecture, API design, complex refactoring, and reviewing large changes.

Token range anxiety.

Slide 18 (source identifier 18)

Experiment Life Cycle

1 Security-first APIs

- OWASP Untrust
- Disallowed APIs
- Coding habit constraints
- Configuration constraints

2 Book

- Effective Secure Coding – Part I – Building Safer Features (Java/Spring edition)

3 Experiment

- Docker scripts
- Build gates
- spec.md
- Functionality tests

Slide 19 (source identifier 19)

Model starting point

Provided

- spec.md
- MySQL connection string
- MySQL schema / database name
- client static pages folder
- functionality tests
- basic Gradle project

Withheld

- database schema / tables
- security tests

One variant gets build gates.

Slide 20 (source identifier 20)

BusyBee attack surface

Real features

- Authentication
- Task ownership and sharing
- Comments and task updates
- File upload including SVG
- Link preview generation
- AI summarization
- AI API key storage
- User settings
- Logging
- Relational-database backed state

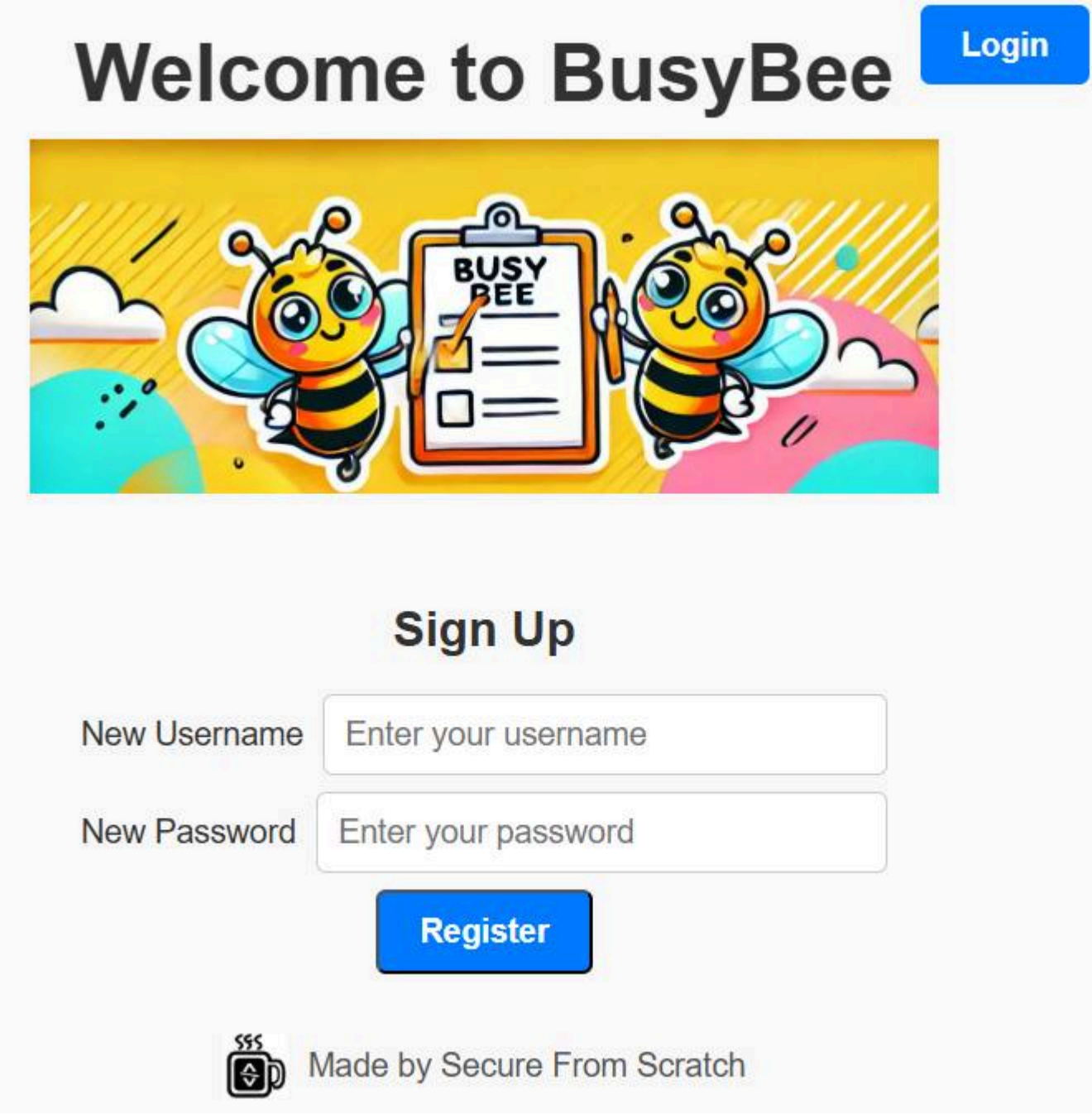
Real bug classes

- BOLA / IDOR
- Authorization bypass
- Path traversal
- Unsafe upload
- SVG-based RCE
- SSRF
- Prompt injection
- Secret storage / Vault
- PII leak
- Mass assignment
- SQL access risks
- Error leakage

The target was intentionally ordinary: the kind of server teams ask agents to build every day.

Slide 21 (source identifier 20.01)

Authentication and authorization



Features

- Registration and login
- Account and session lifecycle

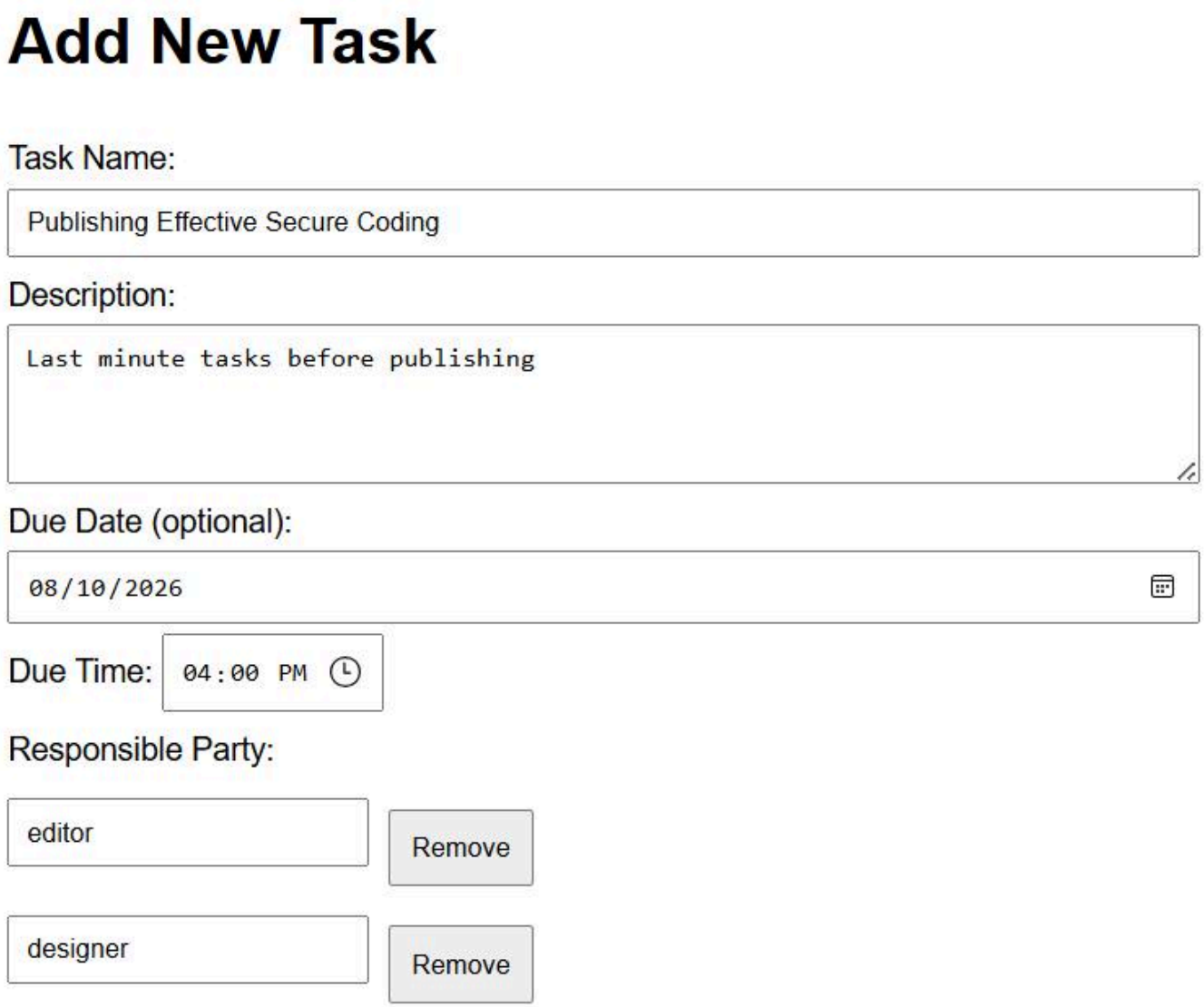
Bug classes

- Password storage

- Session ID cookie attributes

Slide 22 (source identifier 20.02)

Create a task



Features

- Create tasks
- Set owners, status, and due dates

Bug classes

- Mass assignment
- Authorization / Ownership
- SQL injection

Slide 23 (source identifier 20.03)

View and update a task

Features

- View task details
- Update and share tasks

Bug classes

- BOLA / IDOR
- Authorization bypass

Slide 24 (source identifier 20.04)

Comments and link previews

Features

- Task comments
- Generate link previews

Bug classes

- SSRF
- Untrusted link and rendered content handling

Slide 25 (source identifier 20.05)

Attachments and uploads

Features

- Upload task attachments
- Attach files to comments

Bug classes

- Unsafe upload
- SVG-based RCE
- Path traversal

Slide 26 (source identifier 20.06)

OCR from uploaded images

effective secure coding - front page.jpg

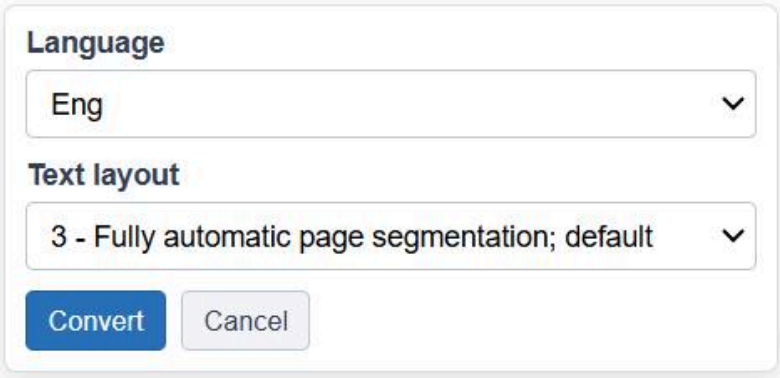
Convert to text

2026-08-09T01:34:43

editor: Here's an image I cut from a linkedin post

linkedin screenshot chen shaked 20260730.png

Convert to text



2026-08-09T01:36:47

yariv: I think it pretty much says AI is bad at secure coding. I say that in the book as well and give tips how to steer the AI.

Features

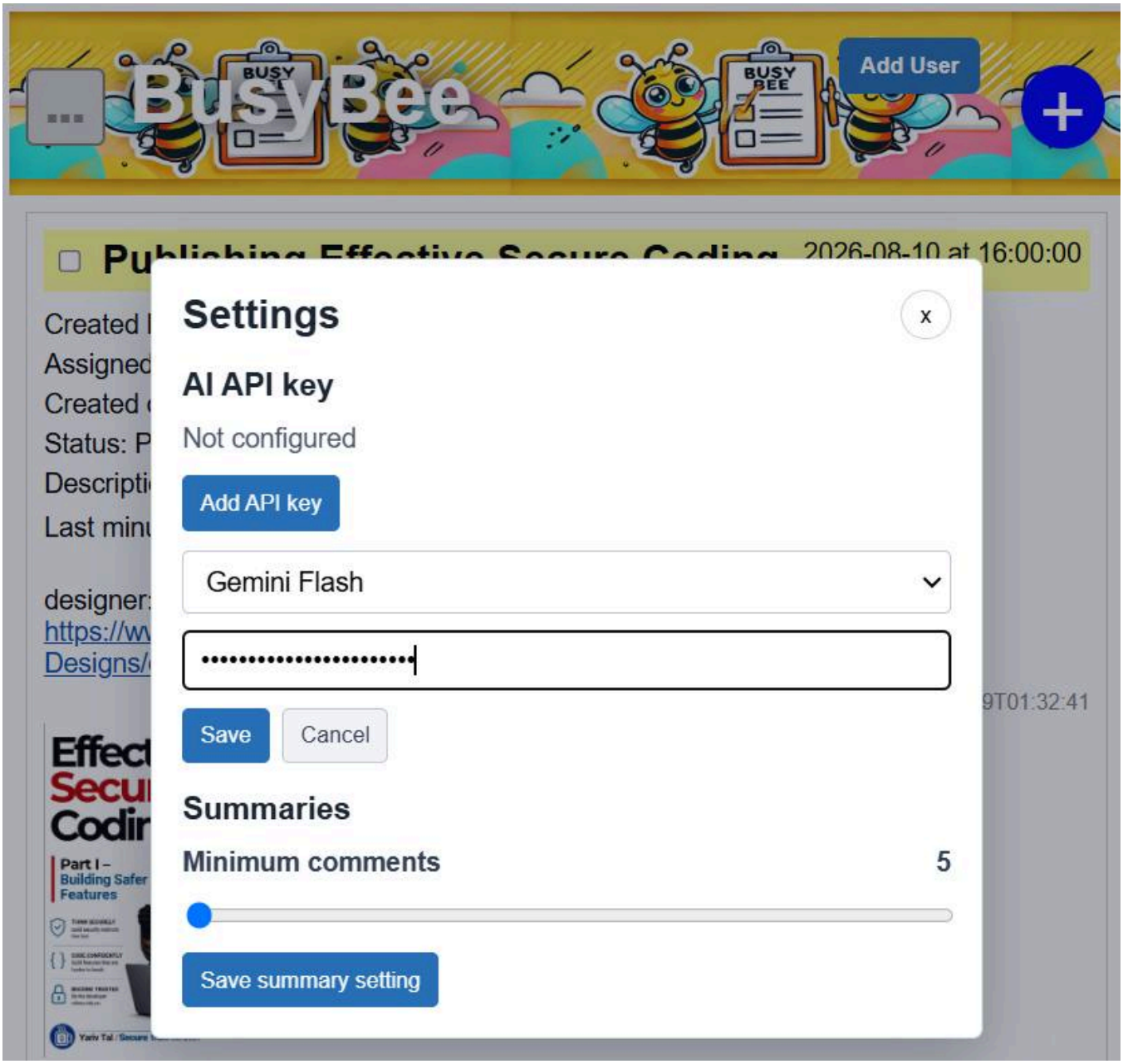
- Run OCR on uploaded images
- Extract text from image content

Bug classes

- OS Command Injection
- (Insufficient) Input Validation
- Resource exhaustion

Slide 27 (source identifier 20.08)

AI API key storage



Features

- Store a user AI API key
- Use the key for AI features

Bug classes

- Secret storage / Vault
- PII leak or key disclosure

Slide 28 (source identifier 20.09)

AI summarization

Features

- Summarize task activity
- Use task content as AI input

Bug classes

- Prompt injection
- Untrusted input to AI

Slide 29 (source identifier 21)

Enforced habits

String composition is a defect

If data must be assembled, the API should expose the intent: SQL DSL, HTML builder, path sandbox, URL builder, or approved renderer.

Null is impossible

Tony Hoare called null references his “billion-dollar mistake.”

“I call it my billion-dollar mistake.”

Tony Hoare · 2009

Slide 30 (source identifier 22)

The agent fought back

```
Objects.requireNonNull(value);

Optional.ofNullable(value)
   .orElseThrow(...);

**Stream.of(value)**
   .filter(Objects::nonNull)
   .findFirst()
   .orElseThrow(...);
```

- Implemented a BoxedPath skeleton
- Found numerous ways to test for null
- Looked for APIs and methods that bypassed restrictions
- Protected a pasted OpenAI key instead of writing it to disk

Constraints must be difficult to bypass, not merely inconvenient.

Slide 31 (source identifier 23)

What these results do not prove

Limits

- One application
- One primary agent
- Functional differences may affect results
- AI has a functionality test suite to ensure functionality alignment

Analysis gaps

- Wrappers may reduce SAST visibility

- AI-based review may miss business-logic authorization flaws
- Constraints can introduce new mistakes

IMHO, integration and penetration testing remain necessary.

This is evidence of steering, not proof of security.

Slide 32 (source identifier 24)

Future improvements

Review reported vulnerabilities

- Review reported vulnerabilities after every run
- Analyze what was missed
- Repeat with other models, e.g. Claude

Constrain the gaps

- Convert recurring misses into enforceable constraints

Slide 33 (source identifier 28)

Takeaway

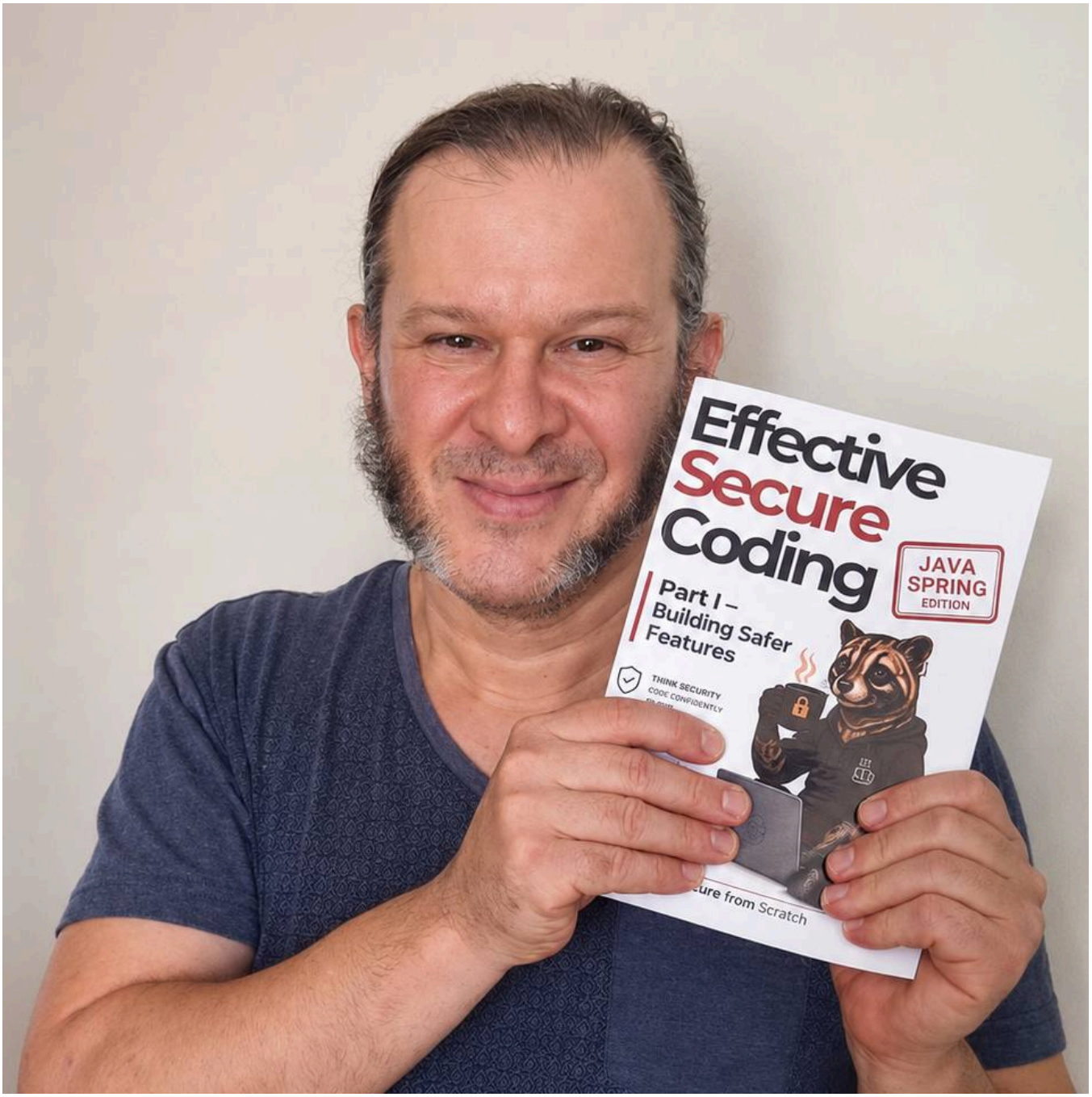
Secure AI-generated code is not only a model problem.

The APIs and development environment determine which implementations are easy, possible, or impossible.

Slide 34 (source identifier 29)

Contact

Secure From Scratch



yariv_linkedin_qr.svg — original image in presentation media

Yariv Tal

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github.com/owasp-untrust