# LowCode/NoCode and Artificial Intelligence

## Leveraging AI models to improve software creation

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April-2023

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# Who Am I?

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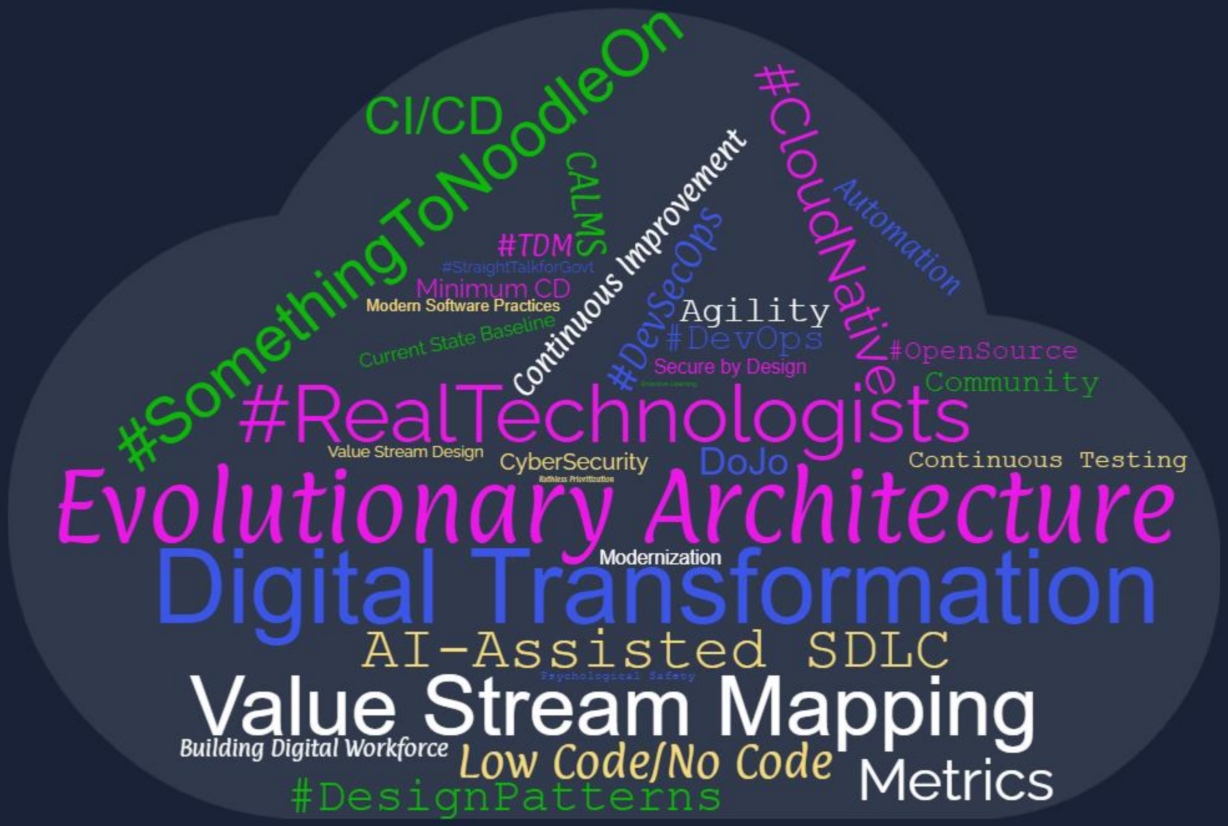
# Tracy L. Bannon

("Trac")

Software architect | engineer | mentor | community leader



vsm consortium Influencer

Ambassador DevOps Institute Advancing the Humans of DevOps

IEEE Senior Member

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# LC/NC Platforms

# Revisited

## No Code

- For those with little or no programming experience
- Provides visual interface with prebuilt components and templates
- Drag and drop functionality creates fully functional applications
- Empowers non-technical users to participate in development
- Increases collaboration

Bubble.io
Microsoft Power Apps
Webflow

## Low Code

- For those with some programming experience
- Provides visual interface with prebuilt components and templates
- Drag and drop functionality
- Caters to tech and non-technical users allowing for custom coding when required
- Lower barriers to entry for software development

OutSystems
Mendix
Appian

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# Benefits of LC / NC

# Revisited

- Rapid development and deployment
- Lower technical barriers to entry
- Cost savings
- Enhanced collaboration
- Standardized security and compliance
- Improved training and support

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# Artificial Intelligence and Software Development

```
openapi: 3.0.0
info:
  title: CRM API
  version: 1.0.0
  description: API for managing customer data in a CRM system
  contact:
    name: John Smith
    email: john.smith@example.com
    url: https://example.com
paths:
  /customers:
    get:
      summary: Retrieve a list of customers
      description: Retrieves a list of customers in the
system, with optional filtering and sorting options.
      parameters:
        - name: filter
          in: query
          schema:
            type: string
```

Based on an illustration by Nicholas Konrad / The New Yorker

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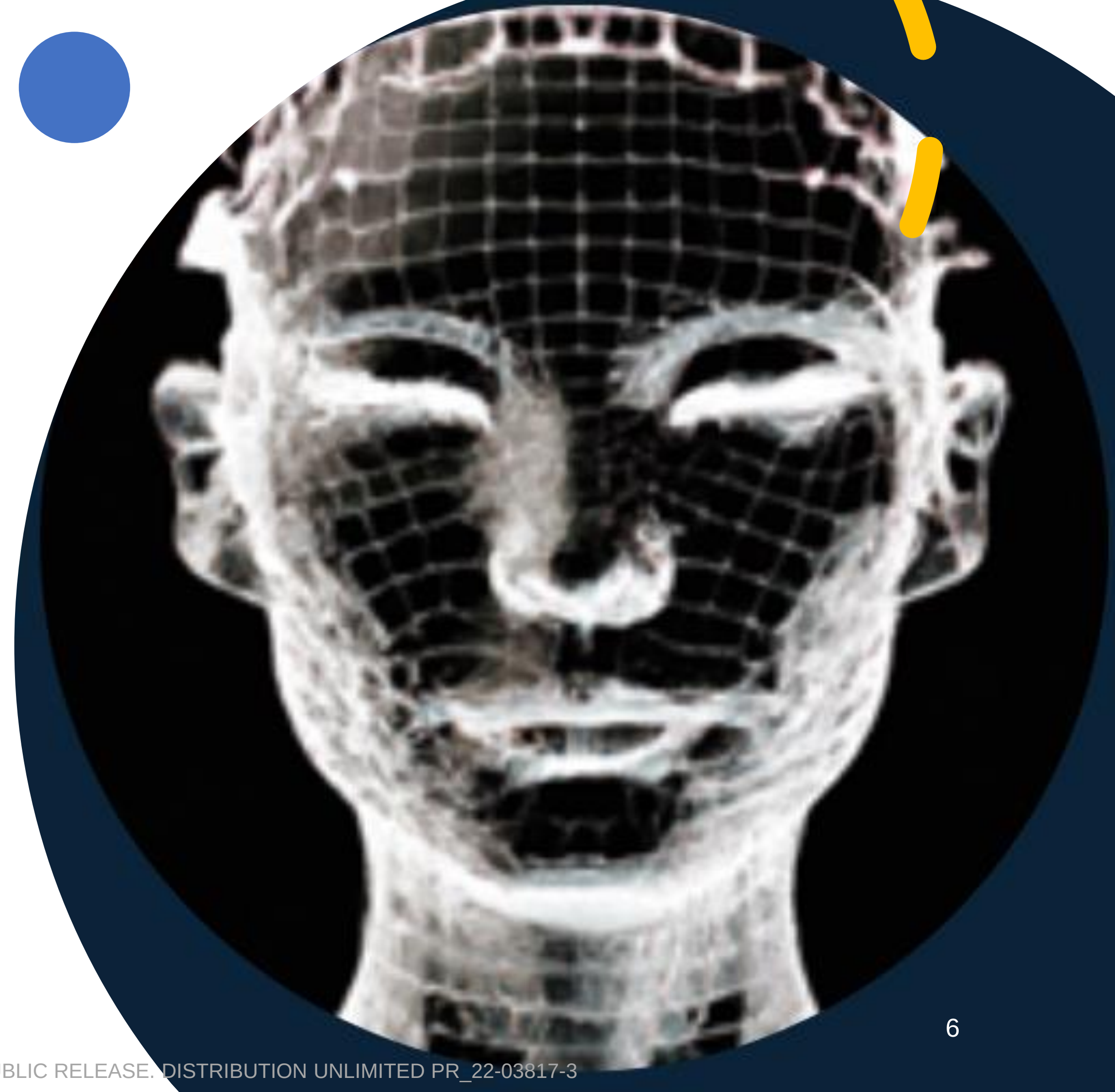
# Some definitions to help our conversation

- **Generative AI** is a category of AI algorithms that focus on generating new content, data, or patterns after being trained on existing information.
- Generative AI includes text, images, video, or even music (tool names)
- **Large language models (LLMS)** are a subset of Generative AI trained on vast amount of text data
- LLMs calculates probability distribution over sequences of words and scores the likelihood of word sequences
- Parameters in LLMs help the model to understand relationships in the text, which helps them to predict the likelihood of word sequences
- By sampling over the probability distribution, the models can write text mimicking human-like language understanding
- **AI-assisted** development often refers to using LLMs to improving developer productivity



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# How can Generative AI be applied to LC/NC?

- Automated app generation (OutSystems, Appian)
- User interface (UI) design. (UI Bakery, Wappler)
- Workflow optimization (Mendix, Microsoft Power Automate)
- Integration support (Zapier, Integromat)
- Domain-specific language (DSL) generation (Betty Blocks, Retool)
- Customizable AI components (Appgyver, Quick Base)

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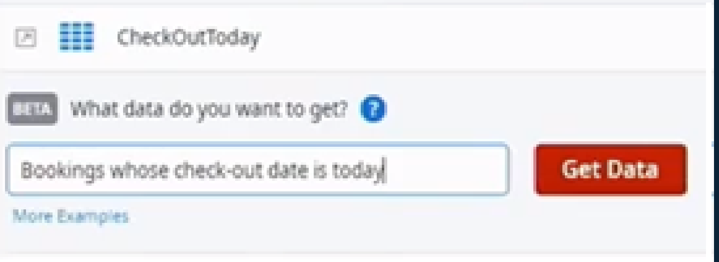
# Generative AI in Low Code Platforms - 1

## Platform: OutSystems - Code Mentor Generative Feature

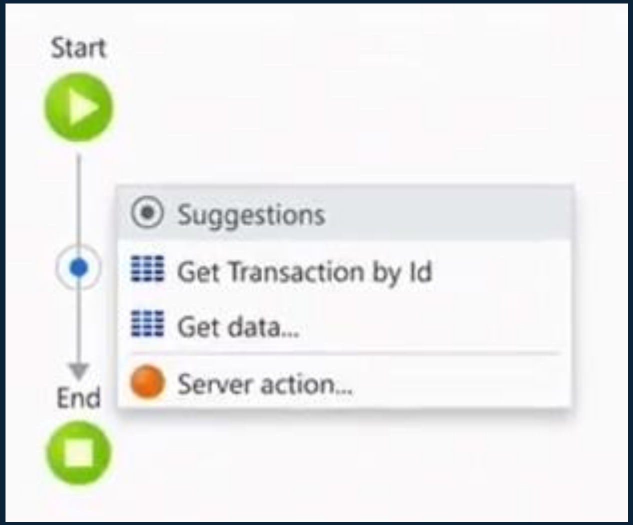
### Natural Language Data Manipulation


CheckOutToday

BETA What data do you want to get?

Bookings whose check-out date is today

### Property or Event Suggestion



*Considerations:*

*Reduces onboarding for new citizen developers*

*Some concerns over dampening creativity*

*Important to ask your vendor what data they are using to training suggestions for property and events*

*Your organization will still need to have specialists with technical depth*

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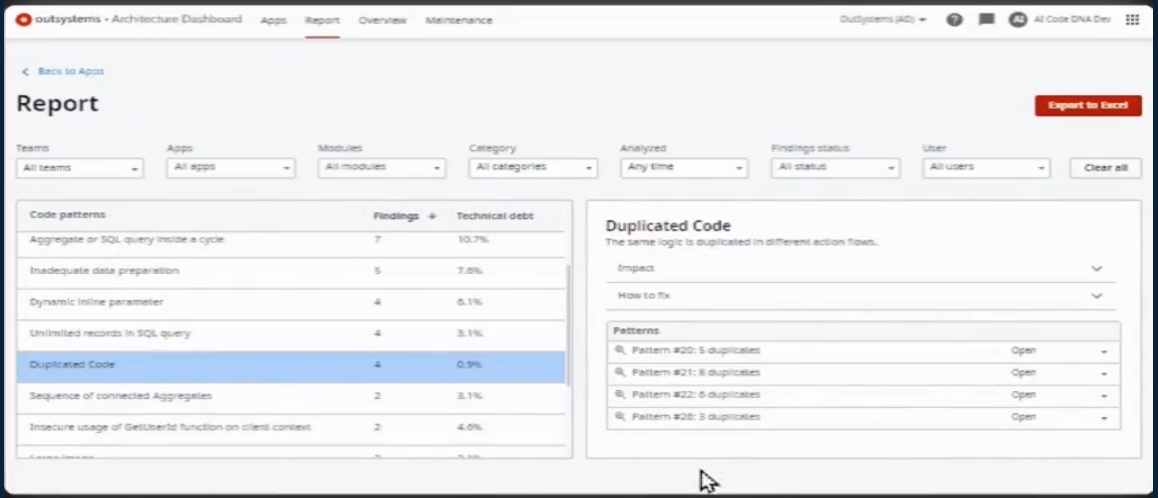
# Generative AI in Low Code Platforms - 2

## Platform: OutSystems - Maintainability Mentor Generative Feature

Guided Refactoring



**Report**

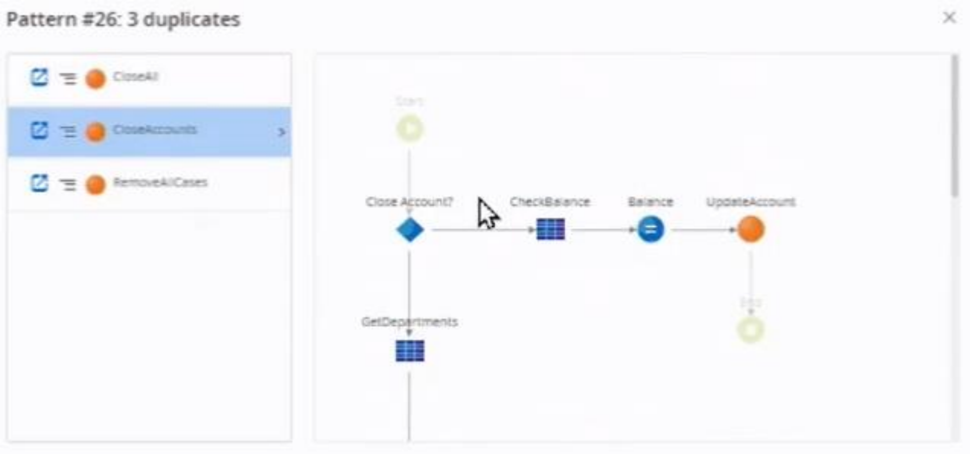
Teams: All teams
Apps: All apps
Modules: All modules
Category: All categories
Analyzed: Any time
Findings status: All status
User: All users

| Code patterns | Findings | Technical debt |
|---|---|---|
| Aggregate or SQL query inside a cycle | 7 | 10.7% |
| Inadequate data preparation | 5 | 7.6% |
| Dynamic inline parameter | 4 | 6.1% |
| Unlimited records in SQL query | 4 | 3.1% |
| Duplicated Code | 4 | 0.9% |
| Sequence of connected Aggregates | 2 | 3.1% |
| Insecure usage of GetUserId function on client context | 2 | 4.6% |

**Duplicated Code**

The same logic is duplicated in different action flows.

| Patterns | |
|---|---|
| Pattern #20: 5 duplicates | Open |
| Pattern #21: 8 duplicates | Open |
| Pattern #22: 6 duplicates | Open |
| Pattern #26: 3 duplicates | Open |



Pattern #26: 3 duplicates

*Considerations:*

*Code Structure Analysis is new to LC/NC*

*Is your code base being used to train the platform’s models?*

*Who should be executing refactoring and how will it be tested?*

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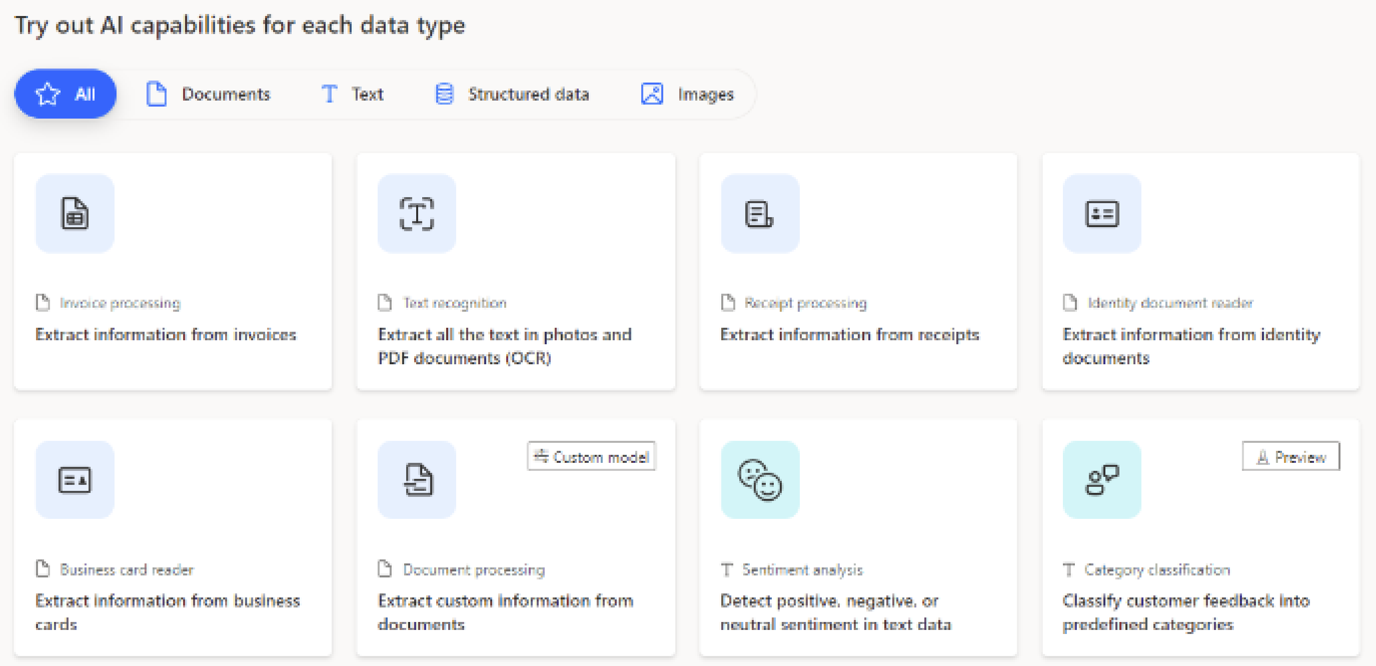
# Generative AI in Low Code Platforms - 3

## Platform: Microsoft Power Automate - AI Builder Generative Feature

### Turnkey Model Building and Embedding



Try out AI capabilities for each data type

Invoice processing
Extract information from invoices

Text recognition
Extract all the text in photos and PDF documents (OCR)

Receipt processing
Extract information from receipts

Identity document reader
Extract information from identity documents

Business card reader
Extract information from business cards

Document processing
Extract custom information from documents

Sentiment analysis
Detect positive, negative, or neutral sentiment in text data

Category classification
Classify customer feedback into predefined categories

*Considerations:*

*Additional costs for using models*

*Possible performance hits; models need storage and compute*

*Does the vendor use your model/data when you customize a model*

*Use practical restraint when embedding your first model and gauge impact on end users adoption*

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# Questions to ask your Platform Vendor

How does the platform ensure the security and privacy of data used by the generative AI models?

What measures have been taken to prevent the AI model from generating malicious or vulnerable code?

How does the platform manage and control access to the generative AI models and their generated outputs?

How does the vendor handle AI model updates, and what steps are taken to evaluate and maintain the security of the generative AI models over time?

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# Large Language Models and Coding

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# Using LLMs to help with Coding

Whether custom coding or using low code platform, here are some ways to provide AI-assistance with LLMs:

- Code generation and completion
- Code review and quality assurance
- Natural language-to-code translation
- Documentation and knowledge sharing
- Issue identification and debugging
- Personalized learning and training

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# ChatGPT – Quick Context

- Released in November by Open AI
- One million subscribers in first 5 days; over 100 million users now
- Funded, in part, by Microsoft and hosted on Azure
- Creative usage in myriad domains from education to contracting to art to copy
- Spitting out copy with tremendous literary flare

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# The ChatGPT Attraction

The model and the interface essentially understands and responds to natural language text

ChatGPT responses are both <u>eerily entertaining</u> and <u>oddly educational</u>

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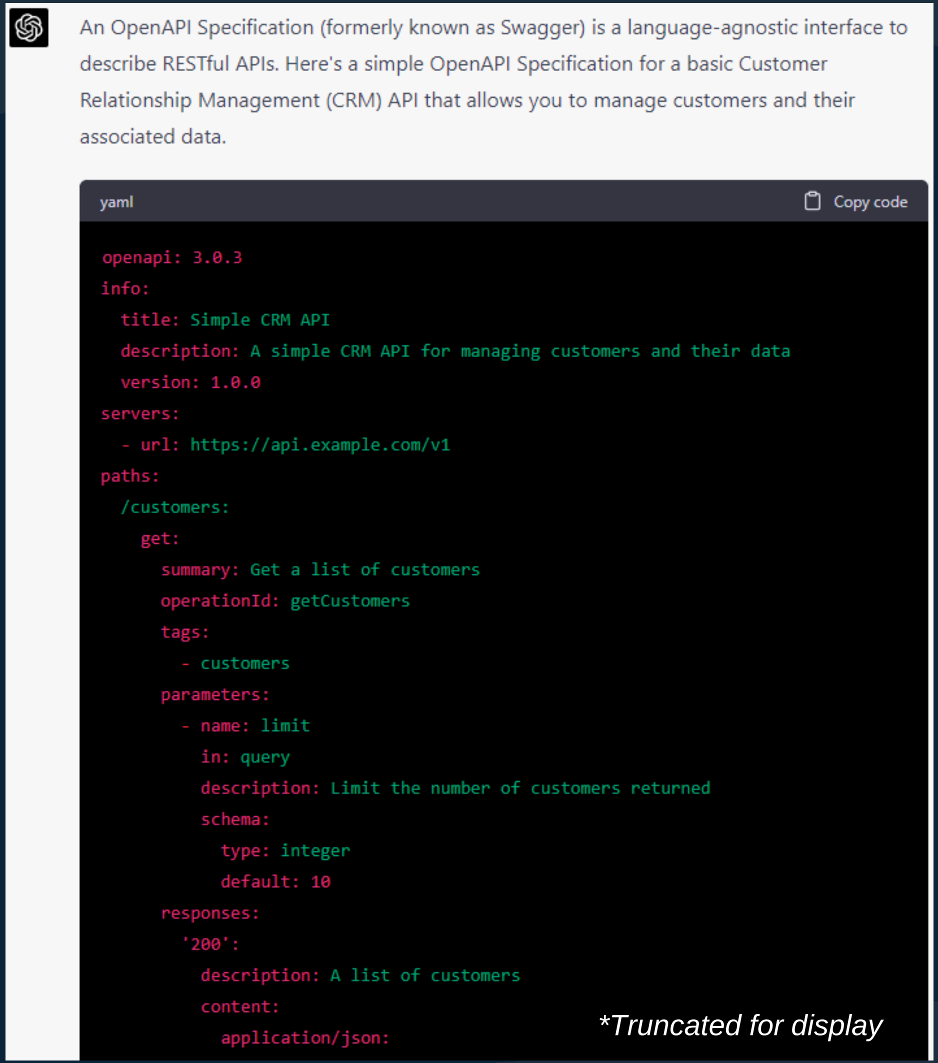
# ChatGPT for API Generation

**Actual ChatGPT Prompt:** *“write an OpenAPI Spec for a CRM API”*

**Generated Response*:**



An OpenAPI Specification (formerly known as Swagger) is a language-agnostic interface to describe RESTful APIs. Here's a simple OpenAPI Specification for a basic Customer Relationship Management (CRM) API that allows you to manage customers and their associated data.

```yaml
openapi: 3.0.3
info:
  title: Simple CRM API
  description: A simple CRM API for managing customers and their data
  version: 1.0.0
servers:
  - url: https://api.example.com/v1
paths:
  /customers:
    get:
      summary: Get a list of customers
      operationId: getCustomers
      tags:
        - customers
      parameters:
        - name: limit
          in: query
          description: Limit the number of customers returned
          schema:
            type: integer
            default: 10
      responses:
        '200':
          description: A list of customers
          content:
            application/json:
```

**Truncated for display*

*Considerations:*

*ChatGPT understood CRM domain*

*Understood HTTP methods (Get, POST, PUT, DELETE)*

*Easily addressed syntax errors when code ported to OpenAPI Generator*

*Little value to using for unit test generation over OpenAPI.Tools*

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# Commonly Claimed ChatGPT Benefits

Faster Results

Focus on higher-level problems, delegate boiler plate code to the platform

Work on problems in domains where you are not an expert

Learn new programming languages

Use AI to explain what a piece of code does

Assisted debugging  and code review

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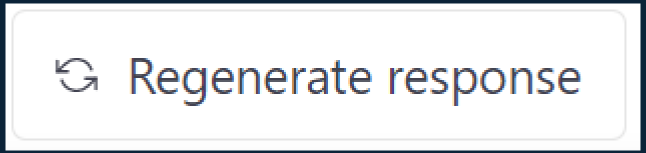

**ChatGPT is very good for coming up with new things that don't follow a predefined script. It's great for being creative... but you can never count on the answer.**

Ajay Agarwal, a professor at the University of Toronto whose research focuses on the economics of AI

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# Rapid Growth Areas

- Rapid Prototyping
- Intelligent Development Assistants
- Analytics Automation and Error Handling
- Automatic Code Refactoring
- Forecast Precise Estimates
- Strategic decision-making
- User experience/Human factor analysis

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# Key Considerations

- SBOM ramifications & tracing lineage
- Detecting generated code
- Offensive and defensive exploitation potential through techniques such as data and model poisoning

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# We need to understand

- Prompt engineering as a discipline; turning human factors on its edge
- Human-Machine teaming
- Software team performance
- Trust and reliability in software outcomes when driven by AI-assisted or AI-generated software
- Automating decisions and software development workflows
- Ethics of prompts and who owns the data once created

**We can’t put the genie back in the bottle; we need to discuss, research, and understand**

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# Concerns and Issues

AI  “sounds” authoritative, it can be flat-out wrong

Quality of the model training: data quality and context

Availability to threat actors

Model training by non-US citizens

Access by nefarious actors

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# Call to Action

## Your next steps:

- Connect with your LC or NC platform vendors to ask model quality and security questions
- Ask your platform vendor about their AI roadmap
- Pulse your organization to see if and how LLMs are being used
- Enable research and discovery or LLM usage with Cybersecurity as your highest priority
- Establish on reasonable guardrails

## What I need from you:

- Share your organization’s story and lessons learned
- Continue to share out new use cases and new tools

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