

The background features a dark blue gradient with large, overlapping, semi-transparent shapes in shades of purple, pink, and orange, creating a modern, abstract design.

AWS re:Invent

NOV. 27 – DEC. 1, 2023 | LAS VEGAS, NV

TNC114

Introduction to prompt engineering

Ivan Kopas

Technical Instructor Team Lead
Amazon Web Services



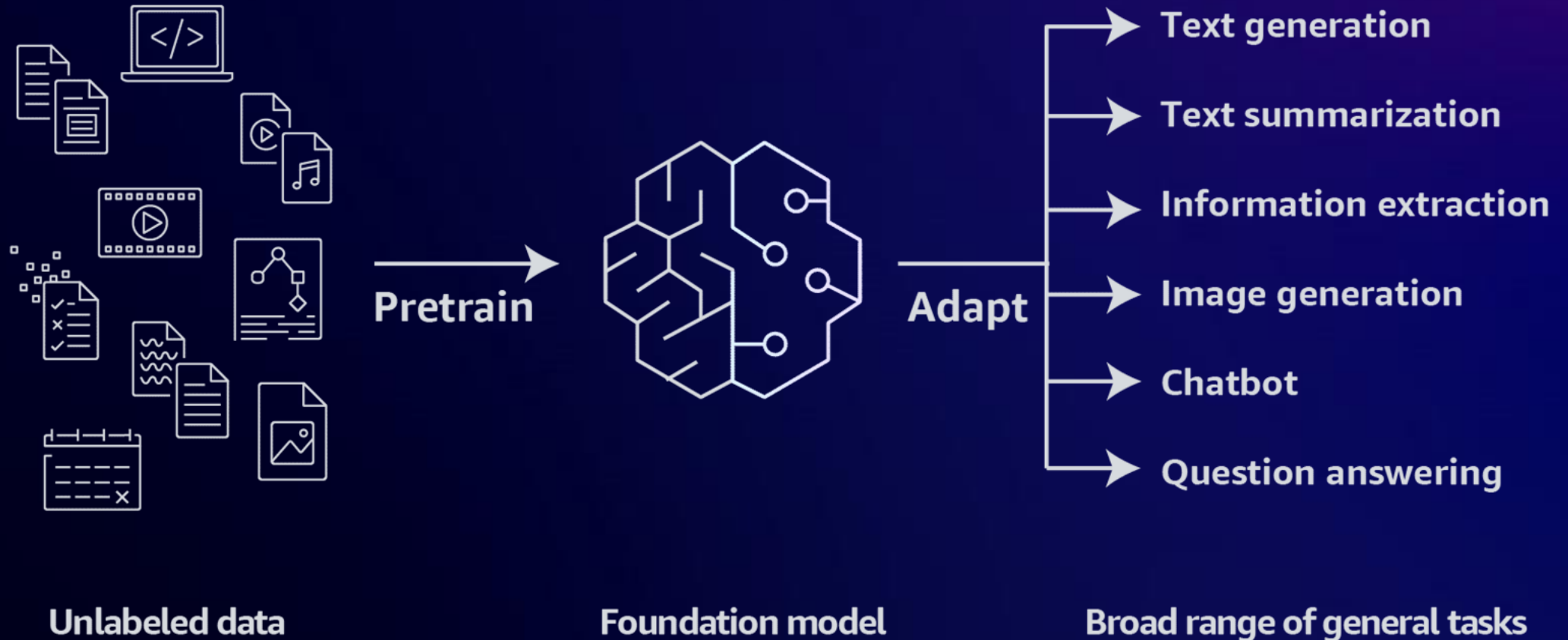
Agenda

- 01 Foundation models and large language models
- 02 Key concepts of prompt engineering
- 03 Basic prompt techniques
 - ◆ Zero-shot prompting
 - ◆ Few-shot prompting
 - ◆ Chain-of-thought prompting

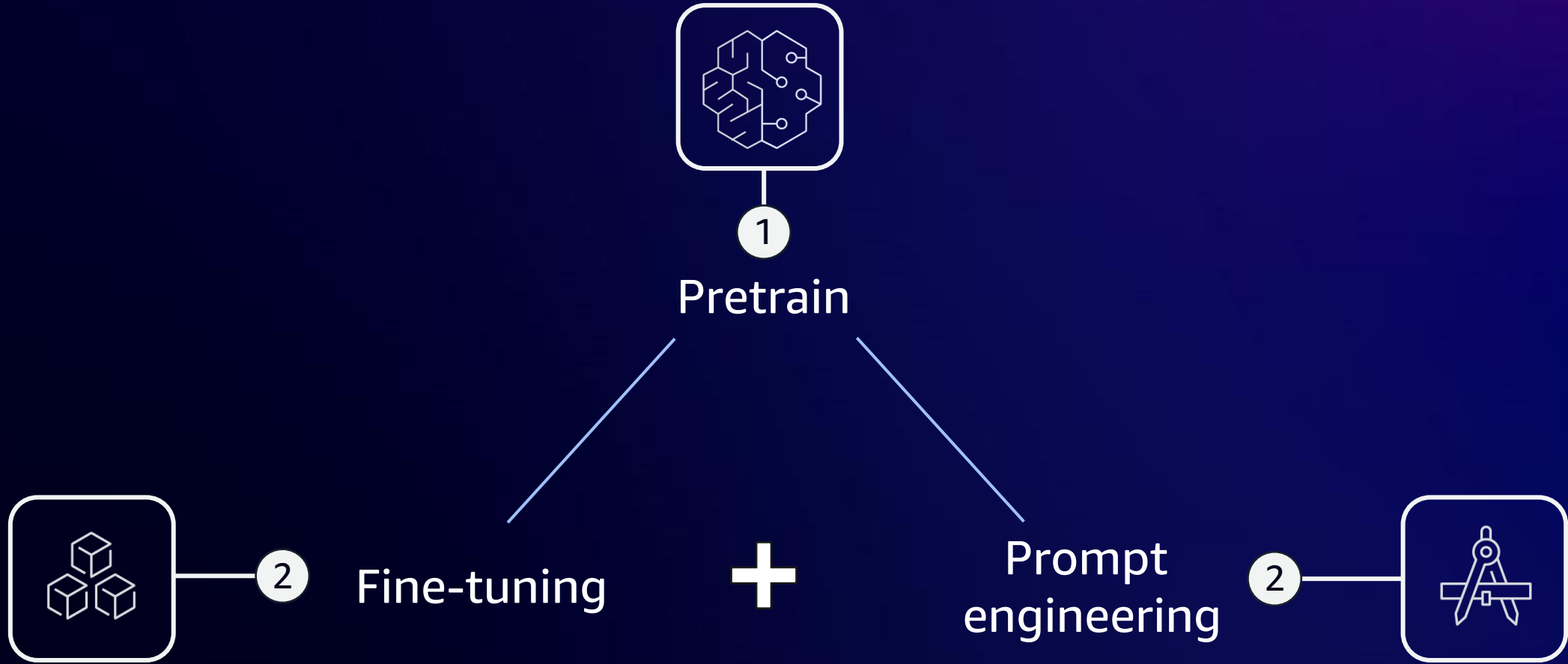


Foundation models and large language models

How does a foundation model function?

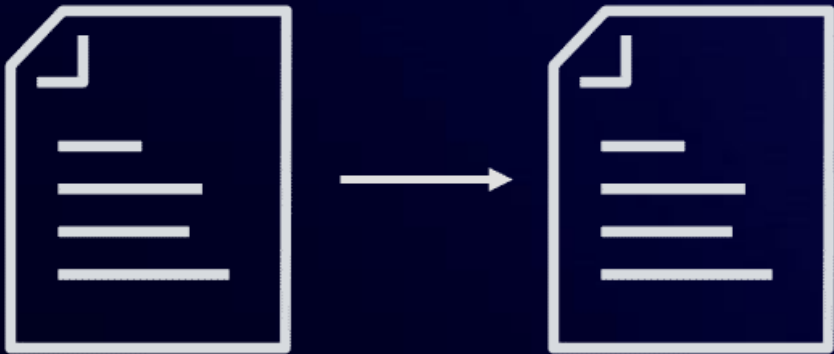


Training FMs

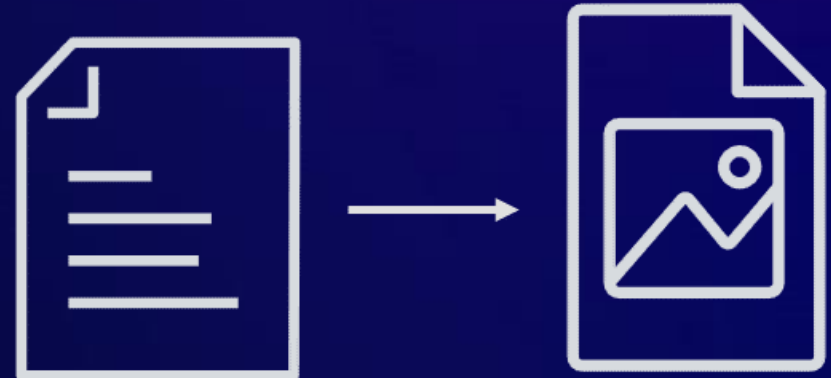


Types of FMs

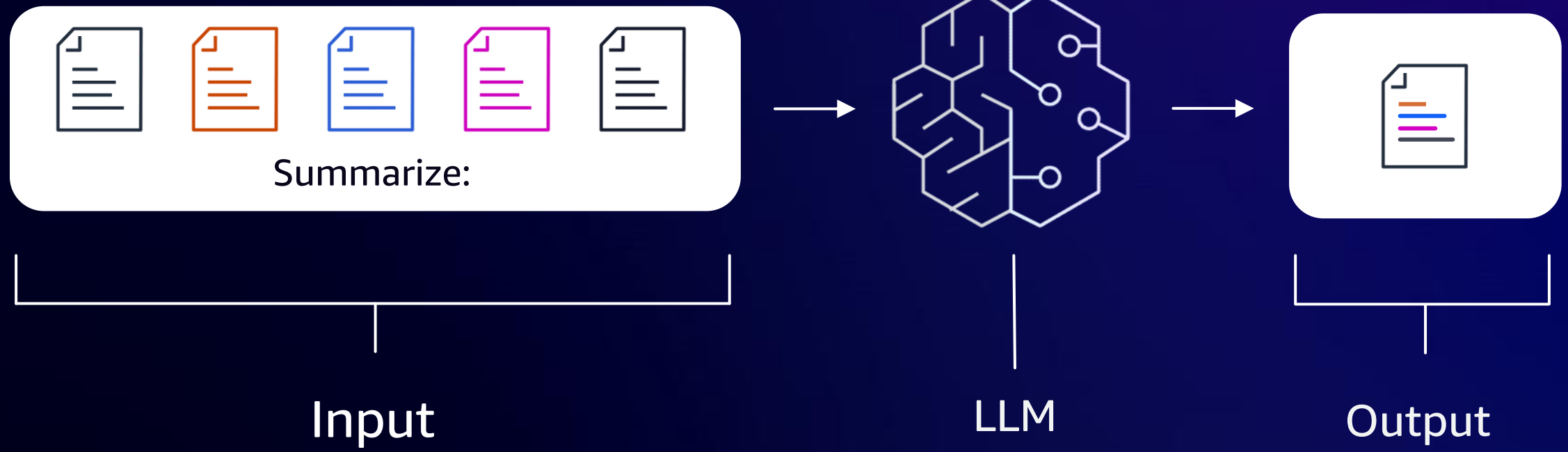
Text-to-text



Text-to-image



Large language models

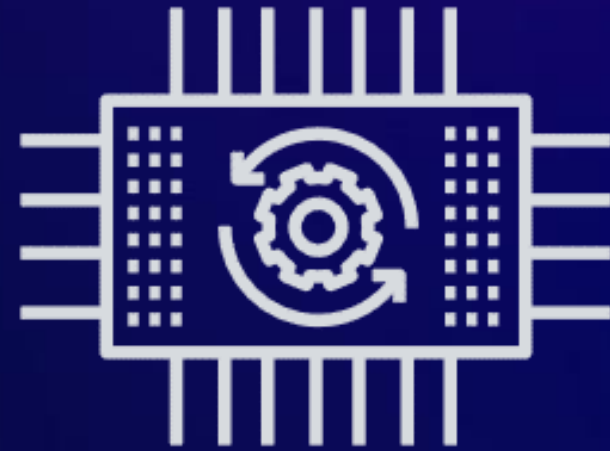


Transformer architecture

1. Encoder converts input into embeddings
2. Decoder consumes embeddings and emits output text

Key features:

- Parallelizable
- Takes less time to train



Neural networks



LLM use cases



Improves customer experience

- Chatbots
- Call analytics
- Agent assist



Boosts employee productivity

- Conversational assist
- Code generation
- Automated report generation



Enhances creativity and content creation

- Marketing
- Sales
- Product development
- Media and entertainment
- News generation



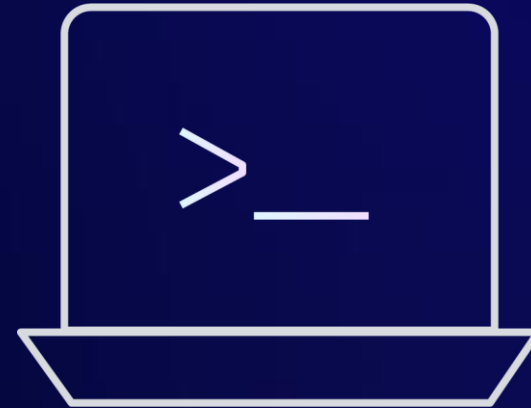
Accelerates process optimization

- Document processing
- Fraud detection
- Supply-chain optimization

Prompt engineering is the fastest way to harness the power of large language models

Key concepts of prompt engineering

Fine-tuning vs. prompt tuning



Elements of a prompt



1

Instructions



2

Context



3

Input data



4

**Output
indicator**

Prompt example

Prompt	Output
<p>Write a summary of a service review using two sentences.</p> <p>Store: Online Service: Shipping</p> <p>Review: Amazon Prime Student is a great option for students looking to save money. Not paying for shipping is the biggest save in my opinion. As a working mom of three that is also a student, it saves me tons of time with free 2-day shipping, and I get things I need quickly and sometimes as early as the next day, while enjoying all the free streaming services and books that a regular Prime membership has to offer for half the price. Amazon Prime Student is only available for college students, and it offers so many things to help make college life easier. This is why Amazon Prime is the no-brainer that I use to order my school supplies, my clothes, and even to watch movies in between classes. I think Amazon Prime Student is a great investment for all college students.</p> <p>Summary:</p>	<p>Amazon Prime Student is a fantastic option for college students, offering free 2-day shipping, streaming services, books, and other benefits for half the price of a regular Prime membership. It saves time and money, making college life easier.</p>

Elements of the prompt example

Instructions
and
output indicator



Context



Input data



Prompt	Output
<p>Write a summary of a service review using two sentences.</p> <p>Store: Online Service: Shipping</p> <p>Review: Amazon Prime Student is a great option for students looking to save money. Not paying for shipping is the biggest save in my opinion. As a working mom of three who is also a student, it saves me tons of time with free 2-day shipping, and I get things I need quickly and sometimes as early as the next day, while enjoying all the free streaming services and books that a regular Prime membership has to offer for half the price. Amazon Prime Student is only available for college students, and it offers so many things to help make college life easier. This is why Amazon Prime is the no-brainer that I use to order my school supplies, my clothes, and even to watch movies in between classes. I think Amazon Prime Student is a great investment for all college students.</p> <p>Summary:</p>	<p>Amazon Prime Student is a fantastic option for college students, offering free 2-day shipping, streaming services, books, and other benefits for half the price of a regular Prime membership. It saves time and money, making college life easier.</p>

Best practices for designing effective prompts



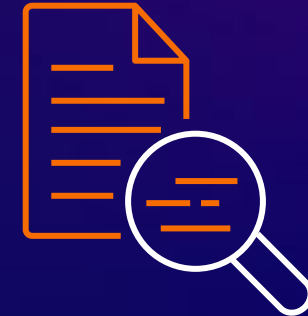
Be clear and concise



Include context



Use directives



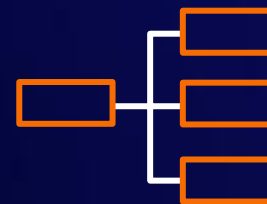
Include output



Start with a question



Provide example responses



Break up complex tasks



Experiment and be creative

Which prompt follows prompting best practices?

BE CLEAR AND CONCISE

Prompt 1

Compute the sum total of the subsequent sequence of numerals: 4, 8, 12, 16.

or

Prompt 2

What is the sum of these numbers: 4, 8, 12, 16?

Which prompt follows prompting best practices?

BE CLEAR AND CONCISE

Prompt 1

Compute the sum total of the subsequent sequence of numerals: 4, 8, 12, 16.

or

Prompt 2

What is the sum of these numbers: 4, 8, 12, 16?

Which prompt follows prompting best practices?

INCLUDE CONTEXT IF NEEDED

Prompt 1

Summarize this article:
[insert article text]

or

Prompt 2

Provide a summary of this article to be used in a blog post:
[insert article text]

Which prompt follows prompting best practices?

INCLUDE CONTEXT IF NEEDED

Prompt 1

Summarize this article:
[insert article text]

or

Prompt 2

Provide a summary of this article to be used in a blog post:
[insert article text]

Which prompt follows prompting best practices?

USE DIRECTIVES FOR THE DESIRED RESPONSE TYPE

Prompt 1

What is the capital of New York? Provide the answer in a full sentence.

or

Prompt 2

What is the capital of New York?

Which prompt follows prompting best practices?

USE DIRECTIVES FOR THE DESIRED RESPONSE TYPE

Prompt 1

What is the capital of New York? Provide the answer in a full sentence.

or

Prompt 2

What is the capital of New York?

Which prompt follows prompting best practices?

CONSIDER THE OUTPUT IN THE PROMPT

Prompt 1

Calculate the area of a circle.

or

Prompt 2

Calculate the area of a circle with a radius of 3 inches (7.5 cm). Round your answer to the nearest integer.

Which prompt follows prompting best practices?

CONSIDER THE OUTPUT IN THE PROMPT

Prompt 1

Calculate the area of a circle.

or

Prompt 2

Calculate the area of a circle with a radius of 3 inches (7.5 cm). Round your answer to the nearest integer.

Which prompt follows prompting best practices?

START PROMPTS WITH A QUESTION

Prompt 1

Why did this event happen?
Explain in three sentences.

or

Prompt 2

Summarize this event.

Which prompt follows prompting best practices?

START PROMPTS WITH A QUESTION

Prompt 1

Why did this event happen?
Explain in three sentences.

or

Prompt 2

Summarize this event.

Which prompt follows prompting best practices?

PROVIDE AN EXAMPLE RESPONSE

Prompt 1

Determine the sentiment of this social media post: “[insert post]”

or

Prompt 2

Determine the sentiment of the following social media post using these examples:

post: “great pen” // Positive

post: “I hate when my phone battery dies” // Negative

“[insert post]” //

Which prompt follows prompting best practices?

PROVIDE AN EXAMPLE RESPONSE

Prompt 1

Determine the sentiment of this social media post: “[insert post]”

or

Prompt 2

Determine the sentiment of the following social media post using these examples:

post: “great pen” // Positive

post: “I hate when my phone battery dies” // Negative

“[insert post]” //

Remember to evaluate and adjust

Review responses and consider...

Quality

Type

Range

...and make changes to the prompts as needed.



Basic prompt techniques



Zero-shot prompting

Providing tasks to an LLM with no examples, or *shots*, of the task

Tips:

- The larger the LLM, the more effective the results
- Instruction tuning can improve zero-shot learning



Zero-shot prompt example

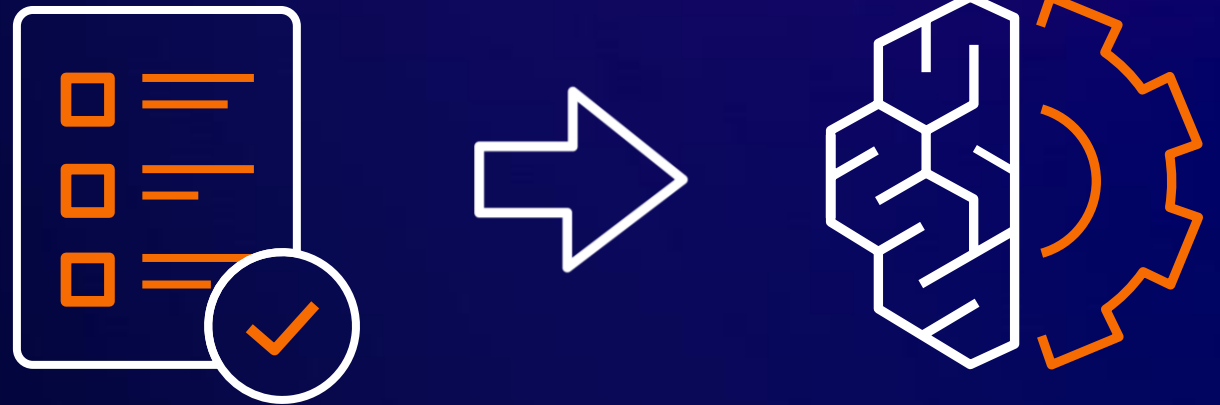
Prompt	Output
<p>Tell me the sentiment of the following social media post and categorize it as positive, negative, or neutral:</p> <p>Don't miss the electric vehicle revolution! AnyCompany is ditching muscle cars for EVs, creating a huge opportunity for investors.</p>	Positive

Few-shot prompting

Providing tasks with contextual information, or a *few shots*, of the output

Tips:

- Correct labels are not needed for effective results, but formatting is important
- Use techniques to obey token limits of your LLM



Few-shot prompt example

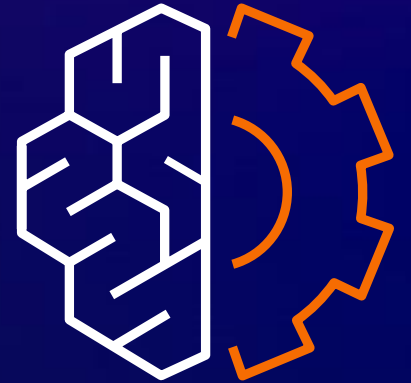
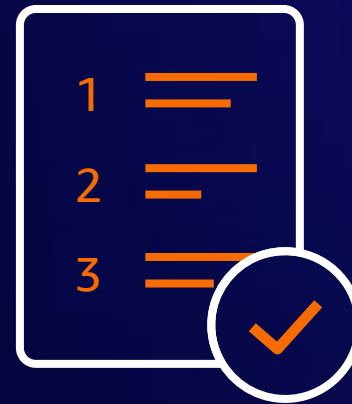
Prompt	Output
<p>Tell me the sentiment of the following headline and categorize it as either positive, negative, or neutral. Here are some examples:</p> <p>Research firm fends off allegations of impropriety over new technology. Answer: Negative</p> <p>Offshore windfarms continue to thrive as vocal minority in opposition dwindles. Answer: Positive</p> <p>Manufacturing plant is the latest target in investigation by state officials. Answer:</p>	Negative

Chain-of-thought prompting

Provides tasks to an LLM and requests the model to think step by step

Tips:

- Most effective method when a task involves several steps or requires a series of reasoning



Chain-of-thought prompt example: Zero-shot

Prompt	Output
<p>Which vehicle requires a larger down payment based on the following information?</p> <p>The total cost of vehicle A is \$40,000, and it requires a 30 percent down payment.</p> <p>The total cost of vehicle B is \$50,000, and it requires a 20 percent down payment.</p> <p>(Think step by step)</p>	<p>The down payment for vehicle A is 30 percent of \$40,000, which is $(30/100) * 40,000 = \\$12,000$.</p> <p>The down payment for vehicle B is 20 percent of \$50,000, which is $(20/100) * 50,000 = \\$10,000$.</p> <p>We can see that vehicle A needs a larger down payment than vehicle B.</p>

Chain-of-thought prompt example: Few-shot

Prompt	Output
<p>In a given week, the viewers for a TV channel are as follows:</p> <p>Monday: 6,500 viewers</p> <p>Tuesday: 6,400 viewers</p> <p>Wednesday: 6,300 viewers</p> <p>Question: How many viewers can we expect on Friday?</p> <p>Answer: Based on the numbers given and without any more information, there is a daily decrease of 100 viewers. If we assume this trend will continue during the following days, we can expect 6,200 viewers on the next day that would be Thursday, and therefore 6,100 viewers on the next day that would be Friday.</p> <p>Question: How many viewers can we expect on Saturday? (Think step by step)</p> <p>Answer:</p>	<p>[Step-by-step answer varies between models]</p>

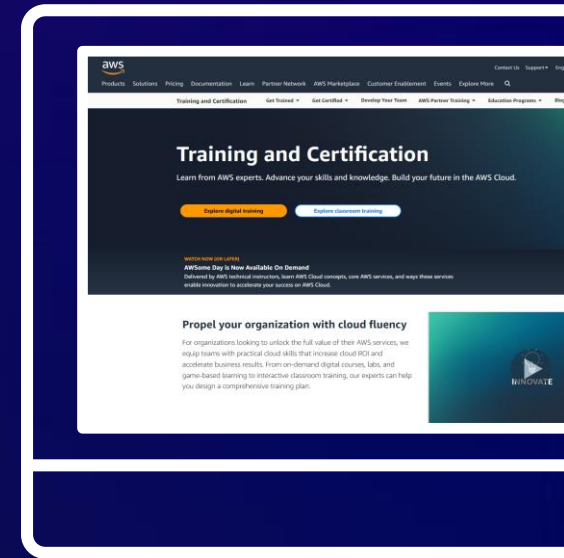
What you've learned...

- 01 Foundation models and large language models
- 02 Key concepts of prompt engineering
- 03 Basic prompt techniques
 - ◆ Zero-shot prompting
 - ◆ Few-shot prompting
 - ◆ Chain-of-thought prompting

Learn more from AWS Training and Certification

Go to the AWS Training and Certification website for more no-cost or low-cost courses on generative AI

AWS Skill Builder



Build brilliantly with AWS Training and Certification

Visit us at the **AWS Training and Certification Lounge** and the **AWS Challenge Lounge** in the Expo to speak to our team, conquer the AWS Jam leaderboard, and more!

In your down time access 100+ **AWS Builder Labs** for free:
reinvent.labs.aws.events.com



Build real skills at re:Invent

Experience a live lab environment with **self-paced labs** – no reserved seating required.

Or, join us in a **training session**:

- Bootcamps
- Spotlight labs and self-paced labs
- Gamified challenges with AWS Jam and Escape Room
- Exam prep sessions
- Breakouts

Find sessions here:



Build your way with **AWS Skill Builder**

Access your **7-day free trial** today for:

- 600+ on-demand courses and learning plans
- 125+ AWS Builder Labs
- AWS Jam Journey
- *AWS Cloud Quest and AWS Industry Quest*
- AWS Certification enhanced exam prep resources
- Share your skills with the world with digital badges

Redeem your free trial:



Thank you!

Ivan Kopas



Please complete the session survey in the mobile app

