Structuring an API call

DEVELOPING AI SYSTEMS WITH THE OPENAI API

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Progress Snapshot

OpenAI Library

Progress Snapshot

OpenAI Library

API Call

Progress Snapshot

OpenAI Library

API Call

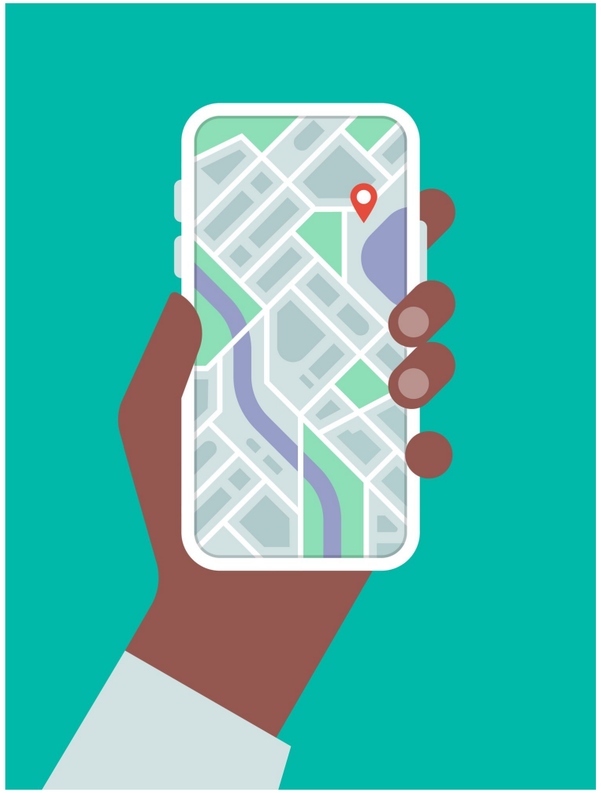
Response Message

Progress Snapshot

```
from openai import OpenAI
client = OpenAI(api_key="ENTER YOUR KEY HERE")
response = client.chat.completions.create(
  model="gpt-4o-mini",
  messages=[
   {"role": "user",
   "content": "Who developed ChatGPT?"}
 ]
)
print(response.choices[0].message.content)
```

```
ChatGPT was developed by OpenAI, an artificial intelligence research lab.
```

Challenges of a production environment



Challenges of a production environment

- Error Handling
  - Displaying user-friendly error messages
  - Alternatives for when the service is unavailable
- Moderation and Safety
  - Control unwanted inputs
  - Minimizing the risk of data leaks
- Testing and Validation
  - Checking for responses that are out of topic
  - Testing for inconsistent behavior
- Communication with External Systems
  - Calling external functions and APIs
  - Optimizing response times

Components of an OpenAI API request

```
from openai import OpenAI

client = OpenAI(api_key="ENTER YOUR KEY HERE")

response = client.chat.completions.create(
  model="gpt-4o-mini",
  messages=[
   {"role": "user",
   "content": "Please write down five trees with their scientific names in json format."}
 ],
  response_format={"type": "json_object"}
)
```

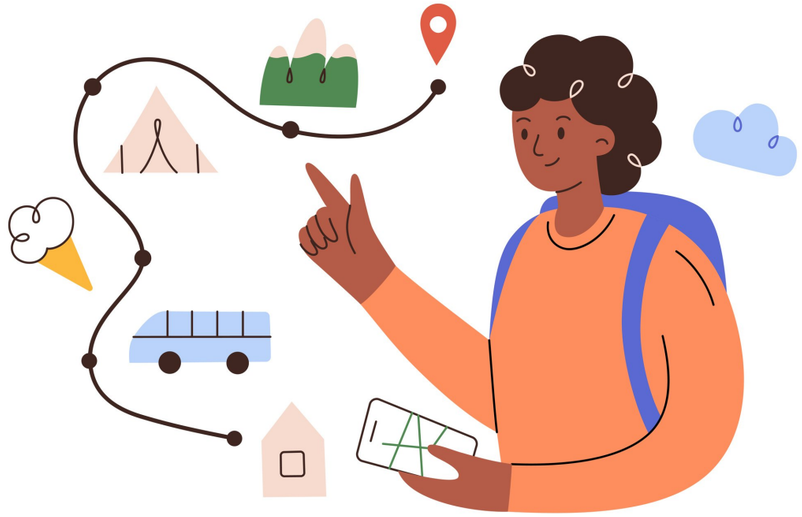
Components of an OpenAI API response

```
print(response.choices[0].message.content)
```

```
{
  "trees": [
    {"commonName": "Oak", "scientificName": "Quercus"},
    {"commonName": "Maple", "scientificName": "Acer"},
    {"commonName": "Pine", "scientificName": "Pinus"},
    {"commonName": "Birch", "scientificName": "Betula"},
    {"commonName": "Willow", "scientificName": "Salix"}
  ]
}
```

What's next

- Integration in production
- Calling external functions
- Best practices



Let's practice!

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Handling errors

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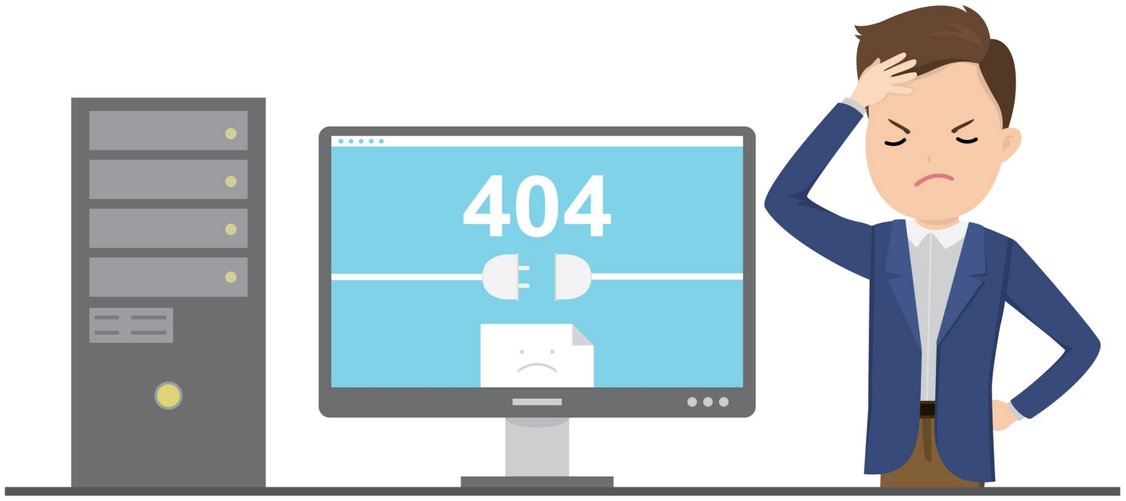
Errors in AI applications

- Simplifying the user experience
- Eliminating barriers



Errors in the OpenAI API library

```
response = client.chat.completions.create(
 model="text-davinci-001",
 messages=[
   {
    "role": "user",
    "content": "List two data science professions with related skills in json format."
   }
 ],
 response_format={"type": "json_object"}
)
```

```
NotFoundError: Error code: 404 - {'error': {'message': 'The model `text-davinci-001`
has been deprecated, learn more here: https://platform.openai.com/docs/deprecations'}}
```

Connection errors

- Generally due to connection issues on either the user's or the service's side
- Examples: `InternalServerError`, `APIConnectionError`, `APITimeoutError`
- Potential solution:
  - Checking your connection configuration
  - Reaching out to support if that fails

Resource limits errors

- Generally due limits on the frequency of requests or the amount of text passed

- Examples: `ConflictError` , `RateLimitError`

- Potential solution:
  - Checking limit restrictions
  - Ensure requests are within limits

Authentication errors

```
client = OpenAI(api_key="This is an Invalid Key")
response = client.chat.completions.create(
 model="gpt-4o-mini",
 messages=[
   {
    "role": "user",
    "content": "List two data science professions with related skills in json format."
   }
 ],
 response_format={"type": "json_object"}
)
```

```
AuthenticationError: Error code: 401 - {'error': {'message': 'Incorrect API key provided:
ThisIsNo*AKey. You can find your API key at https://platform.openai.com/account/api-keys.'}}
```

Bad request errors

```
response = client.chat.completions.create(
 model="gpt-4o-mini",
 messages=[
   {"role": "This is not a Valid Role", "content": "List two data science
   professions with related skills in json format."}
 ],
 response_format={"type": "json_object"}
)
```

```
BadRequestError: Error code: 400 - {'error': {'message': "'NotARole' is not one of
['system', 'assistant', 'user', 'function'] - 'messages.0.role'",
'type': 'invalid_request_error', 'param': None, 'code': None}}
```

Handling exceptions

```
try:
    response = client.chat.completions.create(
     model="gpt-4o-mini",
     messages=[{"role": "user",
      "content": "List five data science professions."}])
except openai.AuthenticationError as e:
  print(f"OpenAI API failed to authenticate: {e}")
  pass
except openai.RateLimitError as e:
  print(f"OpenAI API request exceeded rate limit: {e}")
  pass
except Exception as e:
  print(f"Unable to generate a response. Exception: {e}")
  pass
```

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Batching

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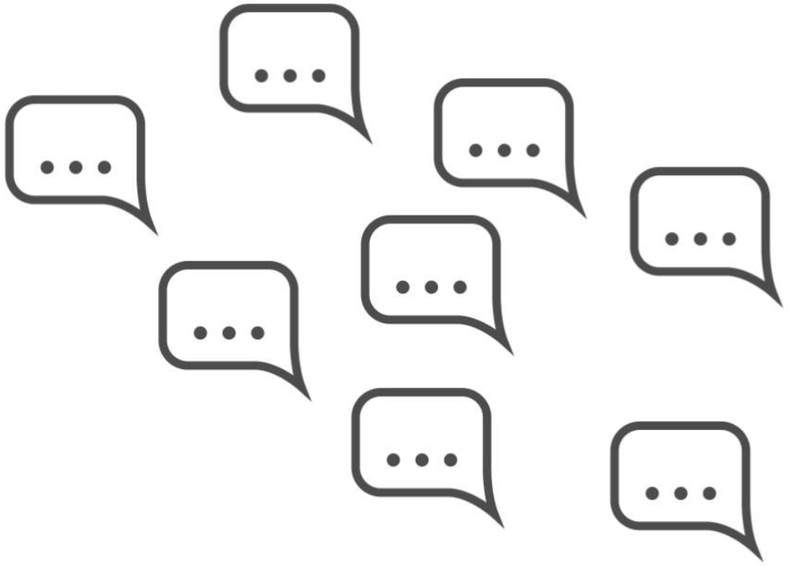
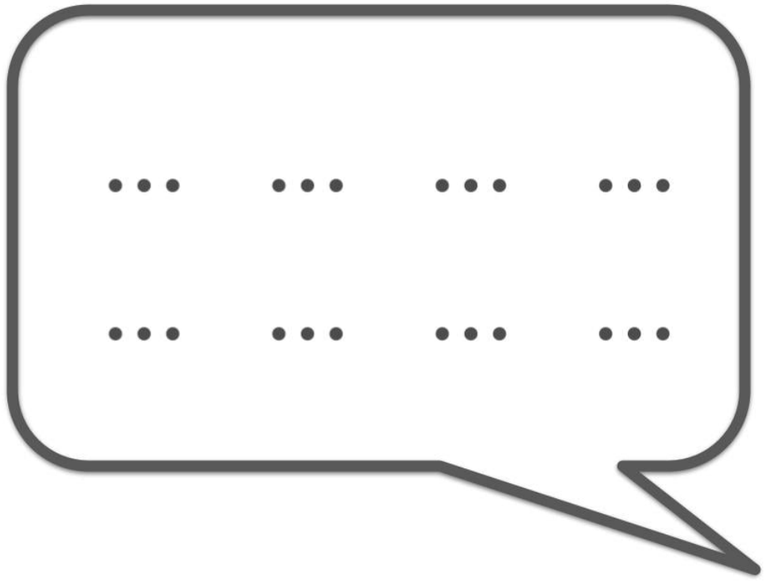
What are rate limits

How rate limits occur

- Too many requests



- Too much text in the request



Avoiding rate limits

- Retry
  - Short wait between requests
- Batching
  - Processing multiple messages in one request
- Reducing tokens
  - Quantifying and cutting down the number of tokens

Retrying

```
from tenacity import (
    retry,
    stop_after_attempt,
    wait_random_exponential
)
@retry(wait=wait_random_exponential(min=1, max=60), stop=stop_after_attempt(6))
```

Retrying

```
@retry(wait=wait_random_exponential(min=1, max=60), stop=stop_after_attempt(6))
def get_response(model, message):
    response = client.chat.completions.create(
      model=model,
      messages=[message],
      response_format={"type": "json_object"}
    )
    return response.choices[0].message.content
```

Batching

```
countries = ["United States", "Ireland", "India"]

message=[
    {
    "role": "system",
    "content": """You are given a series of countries and are asked to return the
    country and capital city. Provide each of the questions with an answer in the
    response as separate content.""",
    }]

[message.append({"role": "user", "content": i }) for i in countries]
```

Batching

```
response = client.chat.completions.create(
      model="gpt-4o-mini",
      messages=message
    )

print(response.choices[0].message.content)
```

```
United States: Washington D.C.
Ireland: Dublin
India: New Delhi
```

Reducing tokens

```
import tiktoken

encoding = tiktoken.encoding_for_model("gpt-4o-mini")
prompt = "Tokens can be full words, or groups of characters commonly grouped
          together: tokenization."

num_tokens = len(encoding.encode(prompt))
print("Number of tokens in prompt:", num_tokens)
```

```
Number of tokens in prompt: 17
```

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