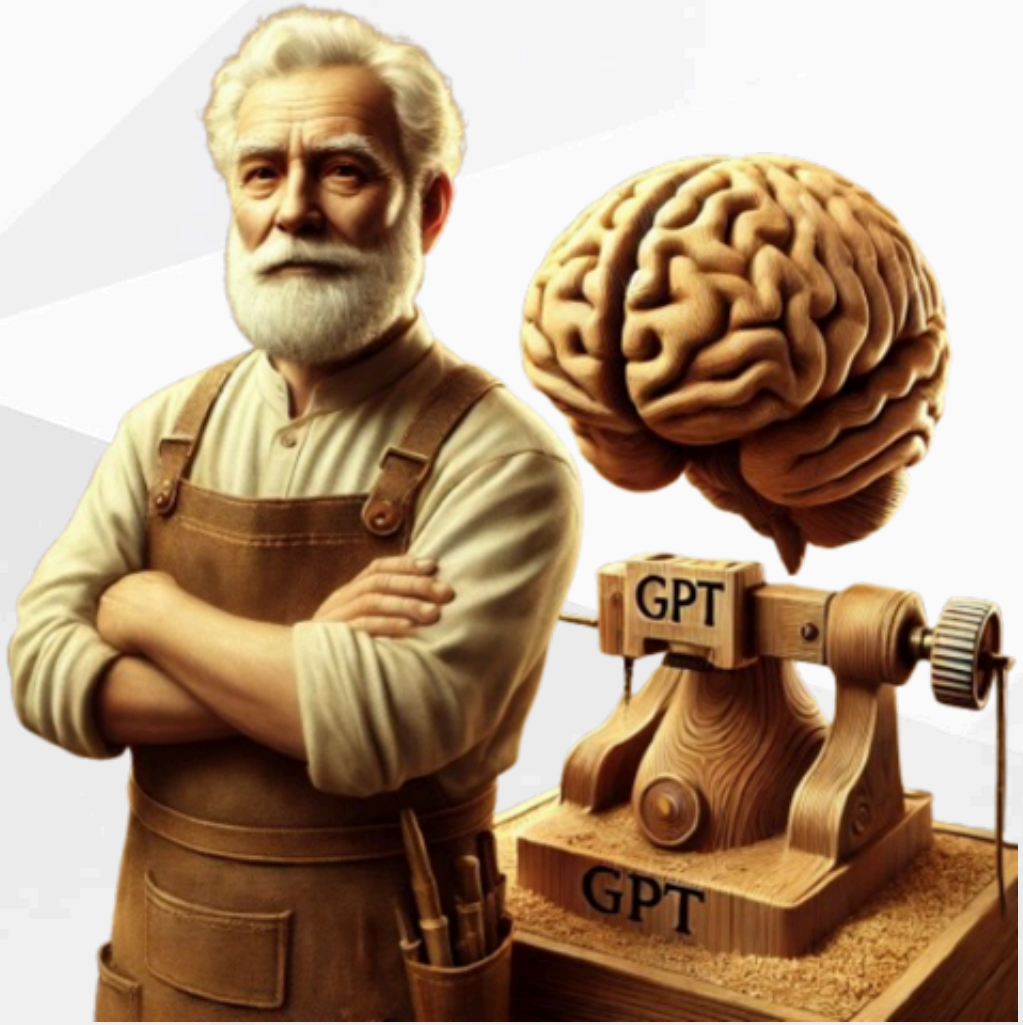
Developing Open LLM applications with

Apache OpenServerless

Lesson 5

Vision and Storage



Vision and Storage

- Analyzing Images
- Vision Form action
- Managing S3 Storage
- Vision Store action

Analyzing Images

Analizing an image with Ollama 1/3

- Ollama Endpoint: `https://<url>/api/chat`

```
import os, pathlib, base64, requests as req, json
# url to access ollama
url = f"https://{os.getenv("AUTH")}@{os.getenv("OLLAMA_HOST")}/api/chat"
```

- read image in base64

```
body = pathlib.Path("tests/vision/cat.jpg").read_bytes()
img = base64.b64encode(body).decode()
```

Analizing an image with Ollama 2/3

- Use a vision model: `llama3.2-vision:11b`
- Post an image `img` in base64 format:

```
msg = {
    "model": 'llama3.2-vision:11b',
    "messages": [ {
        "role": "user",
        "content": "what is in this image?",
        "images": [img]
    } ]
}
```

Analizing an image with Ollama 3/3

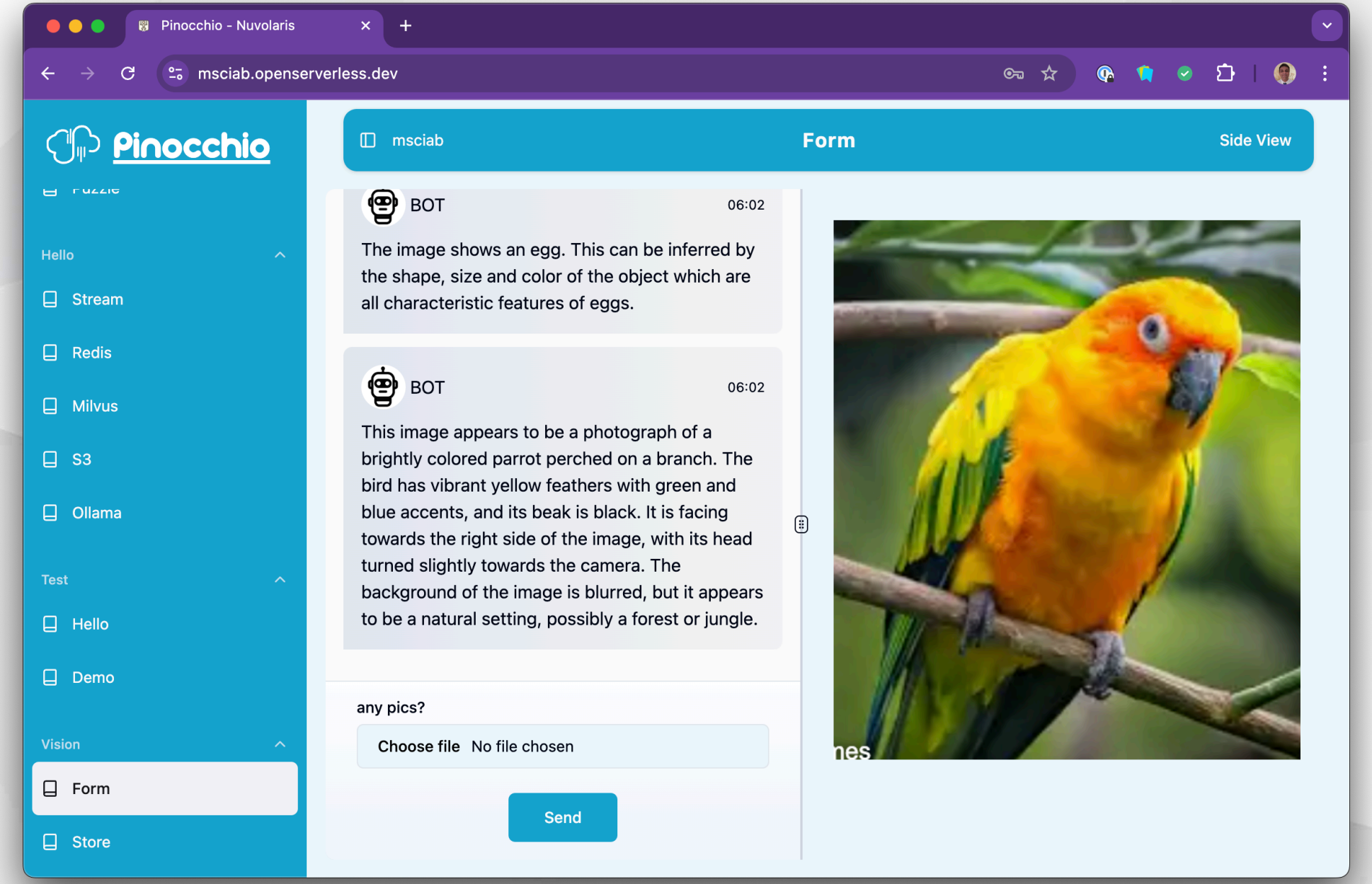
- showing one line of the answer

```
# get vision answer streamed
lines = req.post(url, json=msg, stream=True).iter_lines()
next(lines)  # showing one line
```

- streaming all the result

```
for line in lines:
    chunk = json.loads(line.decode("UTF-8"))
    print(chunk.get("message", {}).get("content", ""), end='')
```

Vision Form action


Pinocchio - Nuvolaris
msciab.openserverless.dev
Pinocchio
Hello
Stream
Redis
Milvus
S3
Ollama
Test
Hello
Demo
Vision
Form
Store
msciab
Form
Side View
BOT
06:02
The image shows an egg. This can be inferred by the shape, size and color of the object which are all characteristic features of eggs.
BOT
06:02
This image appears to be a photograph of a brightly colored parrot perched on a branch. The bird has vibrant yellow feathers with green and blue accents, and its beak is black. It is facing towards the right side of the image, with its head turned slightly towards the camera. The background of the image is blurred, but it appears to be a natural setting, possibly a forest or jungle.
any pics?
Choose file
No file chosen
Send

File Upload

- Form to upload a file:

```
FORM = [{
    "label": "any pics?",
    "name": "pic",
    "required": "true",
    "type": "file"
}]
```

- Retrieve base64 encoded image:

```
  if type(inp) is dict and "form" in inp:
    img = inp.get("form", {}).get("pic", "")
```

Base64 Image Display

- You can display an image in base64 format with:

```
<img src='<base64-image>'>
```

- Using Pinocchio Display support
  - You can embed an HTML snippet to be rendered

```
res['html'] = f'<img src="{img}">'
```

Vision Store Action

- A Vision Class

```
!code packages/vision/form/vision.py
!code tests/vision/test_form.py
```

- The Vision Form action

```
!code packages/vision/form/form.py
```

Managing S3 Storage

S3 Endpoints

WARNING! confusing topic, there are **three** S3 end points!

- Internal DEPLOYMENT endpoint `http`, `S3_HOST` and `S3_PORT`
  - provided by the login
- Internal TEST endpoint: `http`, `S3_HOST` and `S3_PORT` in test
  - configured in `tests/.env`
- External DEPLOYMENT endpoint: `https://s3.openserverless.dev`
  - variable `S3_API_URL`

S3 endpoint

```python
import os
args = {}
# endpoint
host = args.get("S3_HOST", os.getenv("S3_HOST"))
port = args.get("S3_PORT", os.getenv("S3_PORT"))
url = f"http://{host}:{port}"
# bucket
bucket = args.get("S3_BUCKET_DATA", os.getenv("S3_BUCKET_DATA"))
external_url = args.get("S3_API_URL") # not available in test
```

- Internal Deploy: `!ops -config -d | grep S3`
- Internal Test: `!grep S3 tests/.env`

Connecting to the client

```
import os, boto3, base64, pathlib

key = args.get("S3_ACCESS_KEY", os.getenv("S3_ACCESS_KEY"))
sec = args.get("S3_SECRET_KEY", os.getenv("S3_SECRET_KEY"))
client = boto3.client('s3',
   endpoint_url=url,  region_name='us-east-1',
   aws_access_key_id=key, aws_secret_access_key=sec)
```

S3 Read and Write objects

write:

```
body = pathlib.Path("tests/vision/cat.jpg").read_bytes()
client.put_object(Bucket=bucket, Key="cat.jpg", Body=body)
```

read:

```
res = client.get_object(Bucket=bucket, Key='cat.jpg')
data = res["Body"].read()
```

Listing a bucket and deleting objects

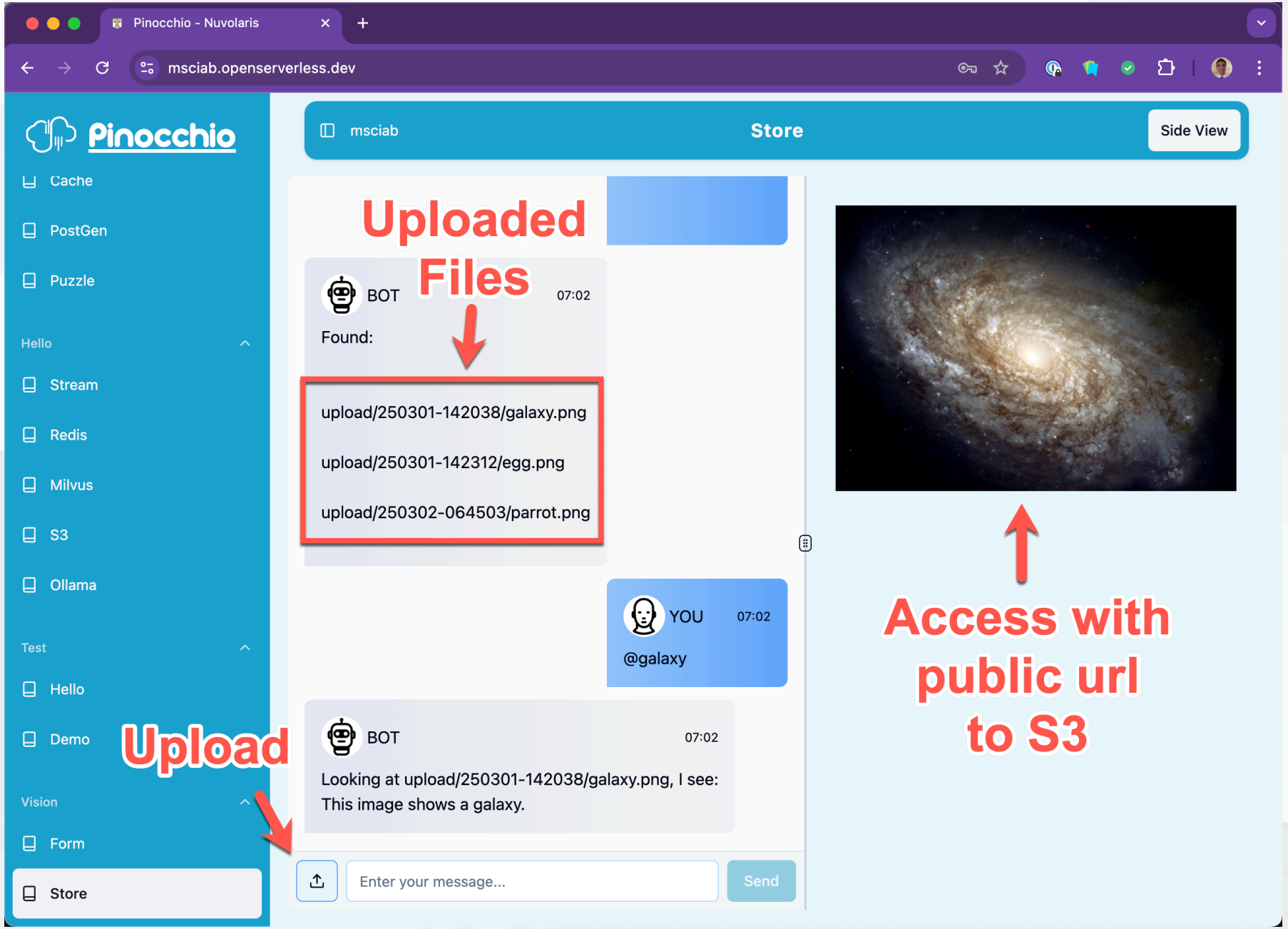
list:

```
res = client.list_objects_v2(Bucket=bucket)
'Contents' in res
res['Contents']
```

delete:

```
### delete:
```python
client.delete_object(Bucket=bucket, Key='cat.jpg')
```
```

Vision Store


Pinocchio - Nuvolaris
msciab.openserverless.dev
Pinocchio
Cache
PostGen
Puzzle
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Stream
Redis
Milvus
S3
Ollama
Test
Hello
Demo
Vision
Form
Store
msciab
Store
Side View
Uploaded Files
BOT
07:02
Found:
upload/250301-142038/galaxy.png
upload/250301-142312/egg.png
upload/250302-064503/parrot.png
YOU
07:02
@galaxy
BOT
07:02
Looking at upload/250301-142038/galaxy.png, I see:
This image shows a galaxy.
Upload
Enter your message...
Send
Access with public url to S3

Showing Images from S3

- You need to create a **signed** url for temporary access

```
client.put_object(Bucket=bucket, Key="cat.jpg", Body=body)
url = client.generate_presigned_url('get_object',
  Params={'Bucket': bucket, 'Key': 'cat.jpg'}, ExpiresIn=3600)
```

- Fixing the url for external access:

```
external_url = "https://openserverless.dev"
from urllib.parse import urlparse, urlunparse
old = urlparse(url) ; pref = urlparse(external_url)
url = urlunparse((pref.scheme, pref.netloc,
                  old.path, old.params, old.query, old.fragment))
```

Vision Upload action

- A `Bucket` Class

```
!code packages/vision/store/bucket.py
!code tests/vision/test_store.py
```

- The Vision Form action

```
!code packages/vision/store/store.py
```

Exercise:

Modify the `vision/form` to store the uploaded files on S3

Hints:

- add the `bucket.py` module to the form
- save the file after decoding it in base64
- generate an unique name using the timestamp
- change the htmo to use the value returned by `exturl`