

Code from virtual machines:

master.py:

```
import os
```

```
import redis
```

```
from flask import Flask, request, jsonify, send_from_directory
```

```
app = Flask(__name__)
```

```
master_redis = redis.StrictRedis(host='localhost', port=6379, decode_responses=True)
```

```
@app.route('/upload', methods=['POST'])
```

```
def upload_file():
```

```
    file = request.files['file']
```

```
    file_path = os.path.join('uploads', file.filename)
```

```
    file.save(file_path)
```

```
    master_redis.sadd('files', file.filename)
```

```
    return jsonify({'message': 'File uploaded successfully'})
```

```
@app.route('/files', methods=['GET'])
```

```
def list_files():
```

```
    files = list(master_redis.smembers('files'))
```

```
    return jsonify(files)
```

```
@app.route('/download/<filename>', methods=['GET'])
```

```
def download_file(filename):
```

```
    file_path = os.path.join('uploads', filename)
```

```
    if os.path.isfile(file_path):
```

```

        return send_from_directory('uploads', filename, as_attachment=True)
    else:
        return jsonify({'error': f'File {filename} not found'}), 404

if __name__ == '__main__':
    if not os.path.exists('uploads'):
        os.makedirs('uploads')
    app.run(host='0.0.0.0', port=5000)

agent.py:
import os
import redis
import requests
from flask import Flask, jsonify

app = Flask(__name__)
agent_redis = redis.StrictRedis(host='localhost', port=6379, decode_responses=True)

MASTER_URL = 'http://<MASTER_IP>:5000'

@app.route('/files', methods=['GET'])
def list_files():
    files = list(agent_redis.smembers('files'))
    return jsonify(files)

@app.route('/download/<filename>', methods=['GET'])

```

```

def download_file(filename):
    file_path = os.path.join('downloads', filename)
    if os.path.isfile(file_path):
        return send_from_directory('downloads', filename)
    else:
        return jsonify({'error': f'File {filename} not found'}), 404

def download_file_from_master(filename):
    try:
        response = requests.get(f'{MASTER_URL}/download/{filename}')
        response.raise_for_status()
        with open(os.path.join('downloads', filename), 'wb') as f:
            f.write(response.content)
        print(f'File {filename} downloaded successfully.')
    except requests.exceptions.RequestException as e:
        print(f'Error downloading file {filename}: {e}')

if __name__ == '__main__':
    if not os.path.exists('downloads'):
        os.makedirs('downloads')

    # Download files from the master server
    for filename in agent_redis.smembers('files'):
        download_file_from_master(filename)

    app.run(host='0.0.0.0', port=5000)

```