上海交通大學
SHANGHAI JIAO TONG UNIVERSITY

OpsOrbital: Real-Time Server Operations from Your Pocket

https://opsorbital.github.io/

Yuan Guo & Junran Zhang

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SJTU
饮 水 思 源 · 爱 国 荣 校

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Project Background & Motivation

I use    and more!

I train models for hours or sometimes days

Sometimes...

Is my process completed?

How is the status of the server?

Is my experiment getting well?

Sometimes...


Colleague
Colleague
Mentor
15:31
结果怎么样了？loss能降下来吗
你下午把epoch=3的结果也跑一下试试，晚上我们sync下

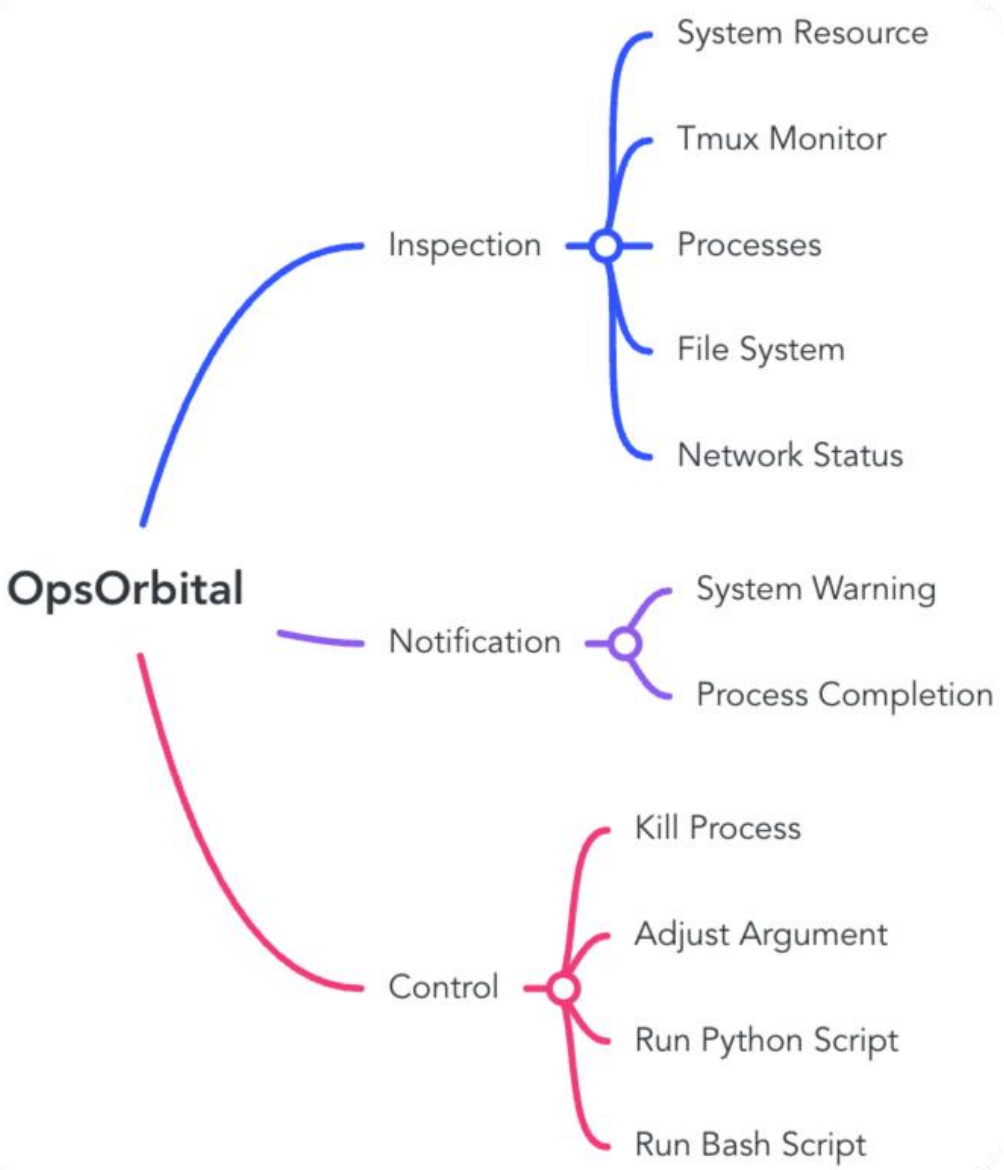
What if...

See my real-time process progress on mobile devices and monitor it?

Do some simple control(e.g. kill&run&adjust hyper-parameters) from my pocket?

Monitor, manage and get timely feedback from my server everywhere I go, even when taking a walk , having my dinner or dating ?

Overview of OpsOrbital



Real-time Inspection,
Notification and Operation
from Your Pocket!

02

Related Work

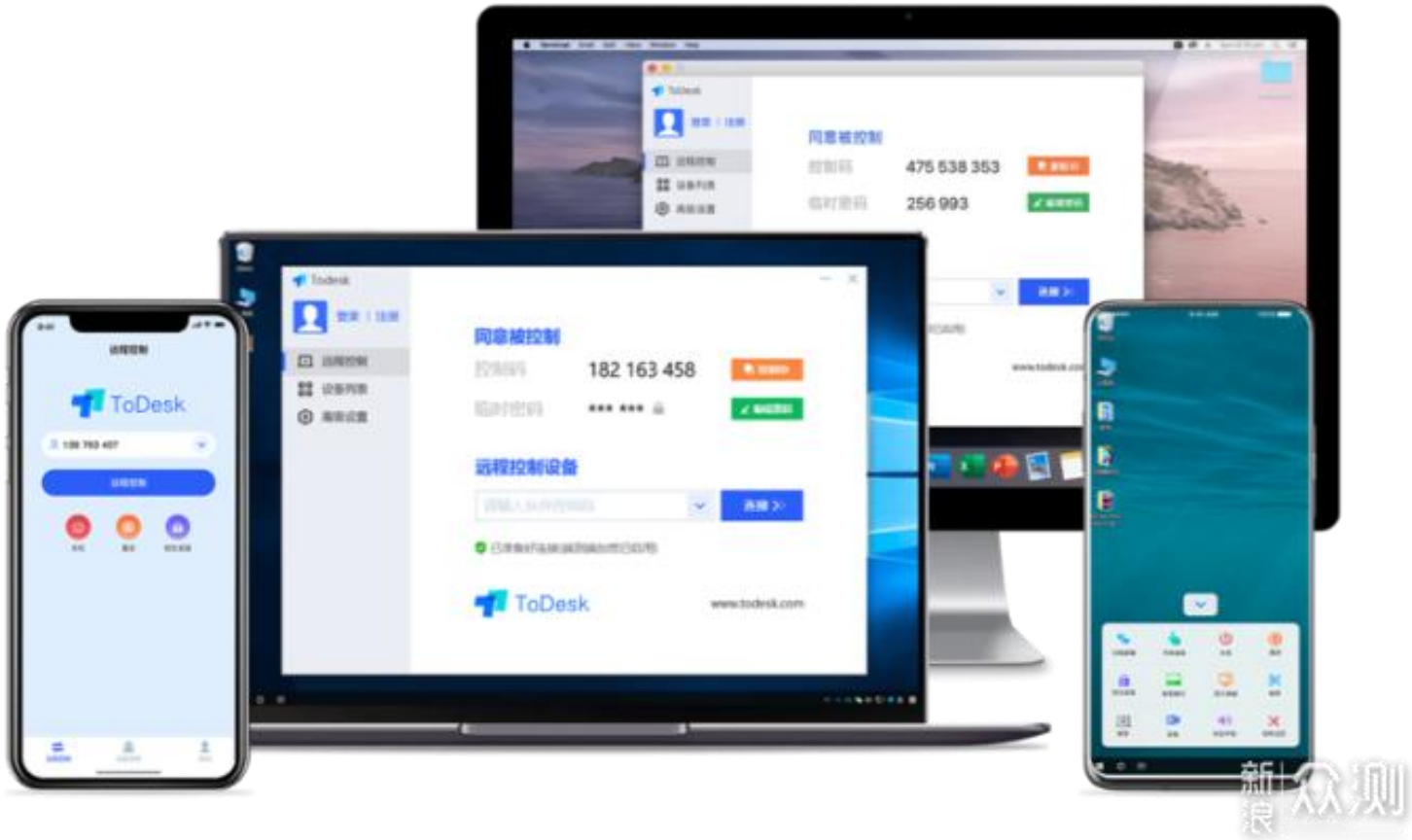
Previous Efforts about Remote Server Control

- **Full Access**
  - Remote Desktop (RayLink etc)
  - Mobile SSH

- **Specialist ML Monitor**
  - TF Watcher
  - Wandb

Previous Efforts about Remote Server Control – Full Access

Remote Desktop (RayLink etc)



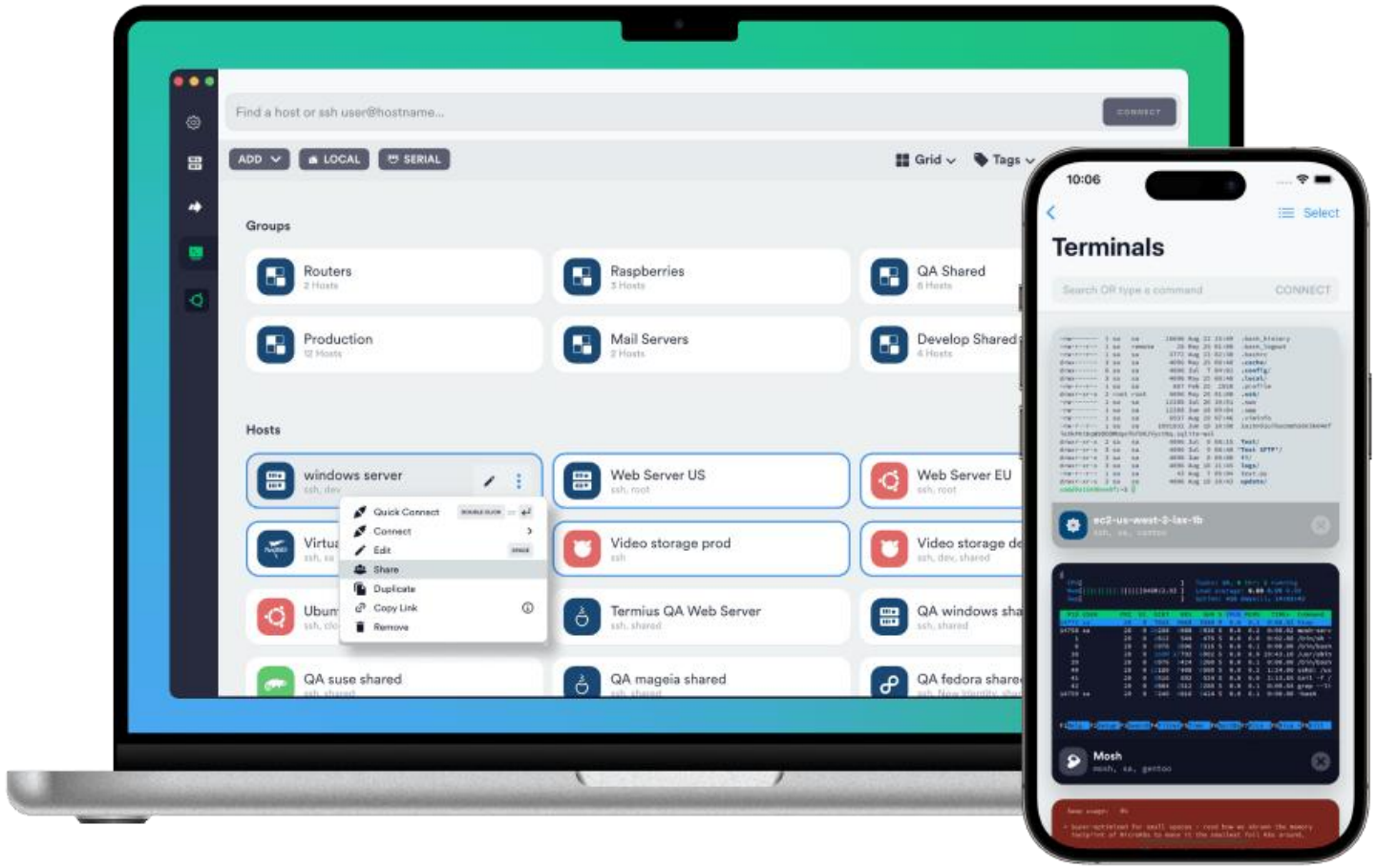
Feature:
- Ideally, could cover most kinds of remote operations

Cons:
- Complex and Redundant

- Does not seem to support Linux system well

Previous Efforts about Remote Server Control – Full Access

Mobile SSH



Feature:

- Seems capable of conducting server operation like using PC

Cons:

- Using command line on mobile device drives everyone crazy

- keyboard shortcuts?

- Proactive notification?

Previous Efforts about Remote Server Control – Specialist ML Monitor

TF Watcher

Feature:
- ML-specific
- Visualization

Cons:
- Specially for Google Colab, Azure ML and Kaggle.

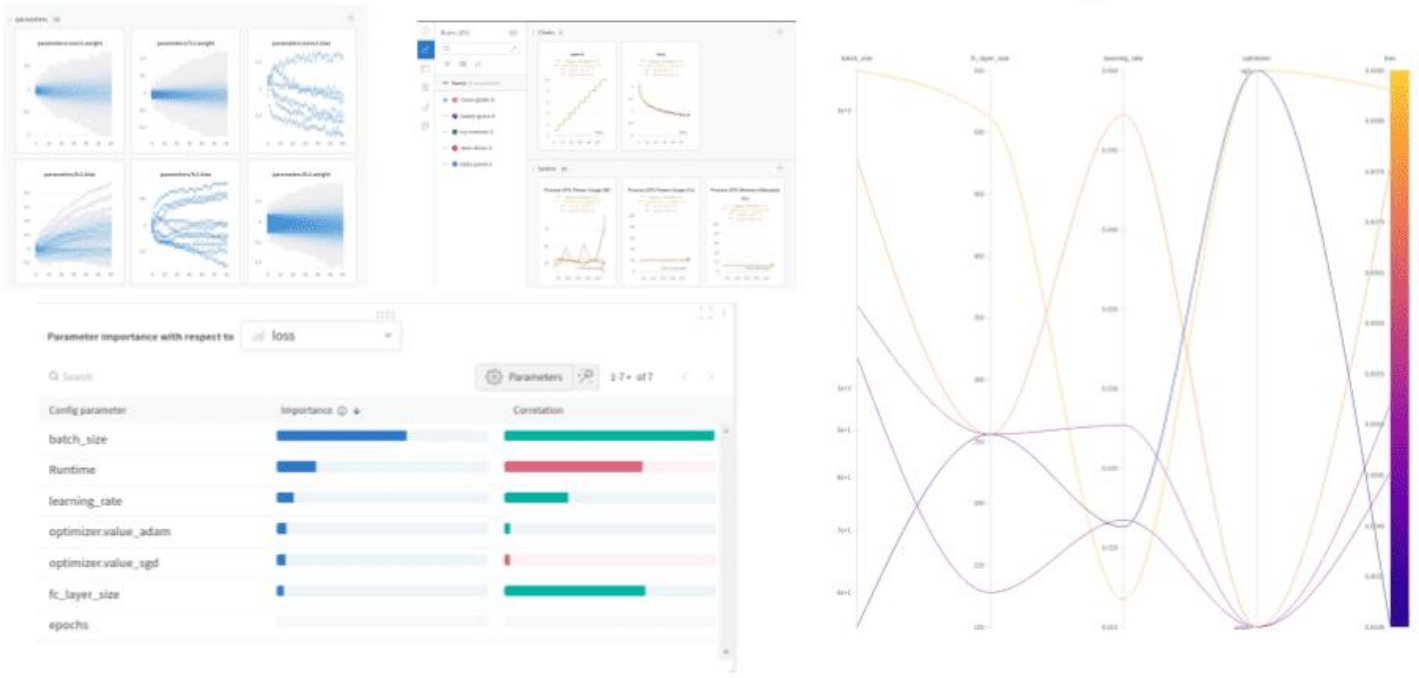
- Relies on changing the script for specific packages

Fork 5 Starred 59

Previous Efforts about Remote Server Control – Specialist ML Monitor

Wandb(Weights & Bias)

Weights & Biases PyTorch



Feature:

- Wonderful training track

- Nice ecosystem

Cons:

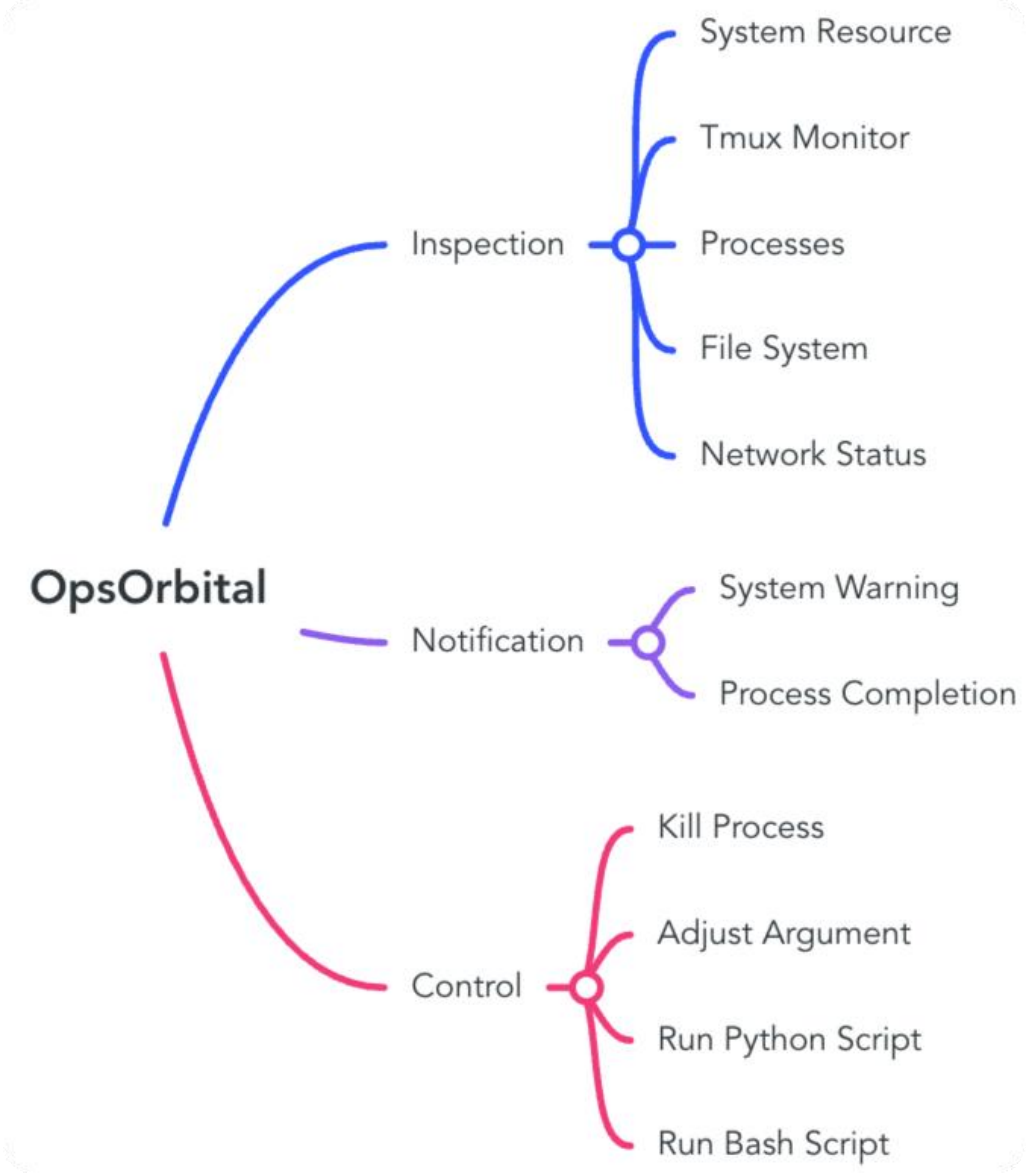
- Tracking only, more like a data analysis app

- Very limited remote control

03

Design of OpsOrbital

OpsOrbital Function Overview



Our Core Idea:

Convenient

LightWeight

Scenario-Specific

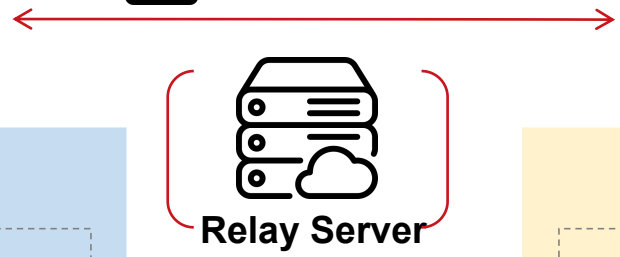
User-Friendly

Beyond Watch-Only:
Easy Control Makes Truly Useful Product

OpsOrbital Design Overview

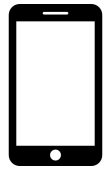
Server

Authentication



Relay Server

Client



Request Forwarding

Request Handling

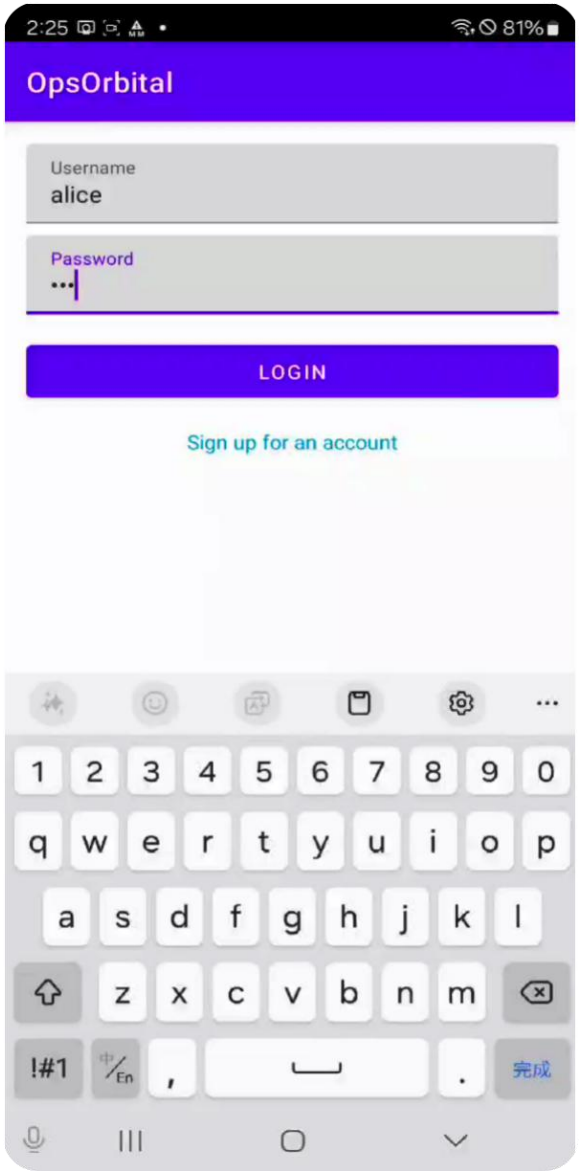
UI Layout Design

Request Trigger

Message Parsing

Background Monitoring

Login Logic



Account Management:

- Set an account on server

- User info manage with SQL

- Authentication when logging in

Connection Management:

- Server has public IP -> RestAPI

- Cannot directly connect -> Relay Server
  Port Forwarding with SSH

Inspection: System Resources

Client:

- Send request for server info

- Use OkHttp to avoid blocking main thread

- Parse the info and update UI

Server:

- Get system version, CPU/Memory/gpu usage with system calls

- Refresh Button: Update

Inspection: Network Details

Client:

- Send request for server info

- Use OkHttp to avoid blocking main thread

- Parse the info and update UI

Server:

- Get network details using ListView
(Interface Name, IP Address, Subnet Mask)

- Refresh Button: Update

Inspection&Control: Process

Inspection:

- Send request for process list

- Use OkHttp to avoid blocking main thread

- Visualize the process list into a dynamic table

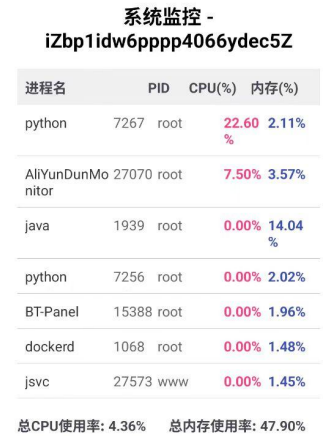
- Automatically / manually refresh

Control:

- Click certain process on client initializes a confirmation pop-up

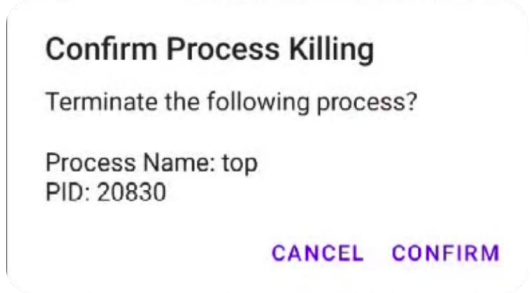
- Terminate the process on server if allowed

Realizing `top`-like command on phone



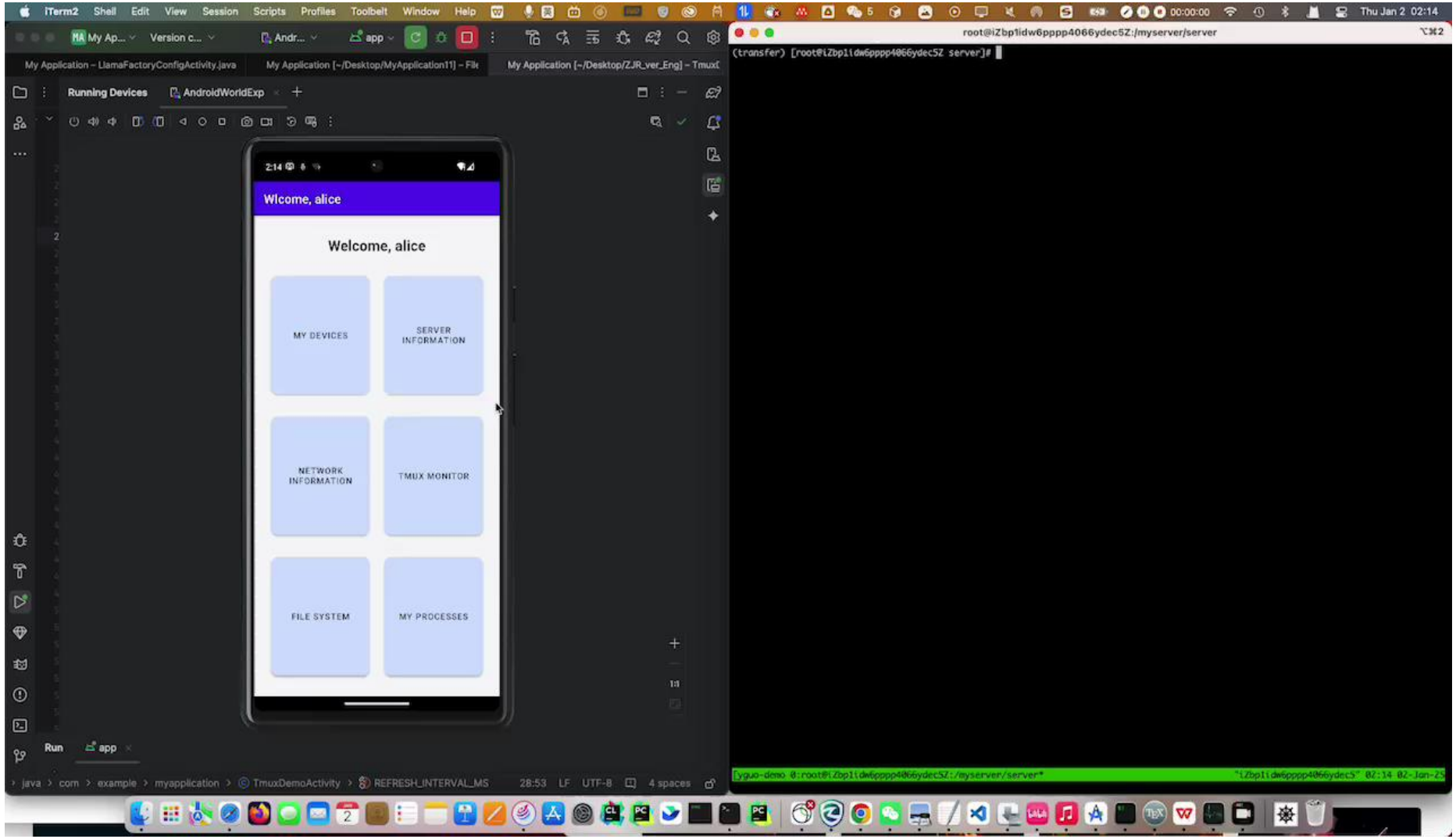
&

Terminate certain process easily



Inspection&Control: Tmux

Real-Time Window Monitor & Shorcut for Process Termination



Enter Tmux Table Interface

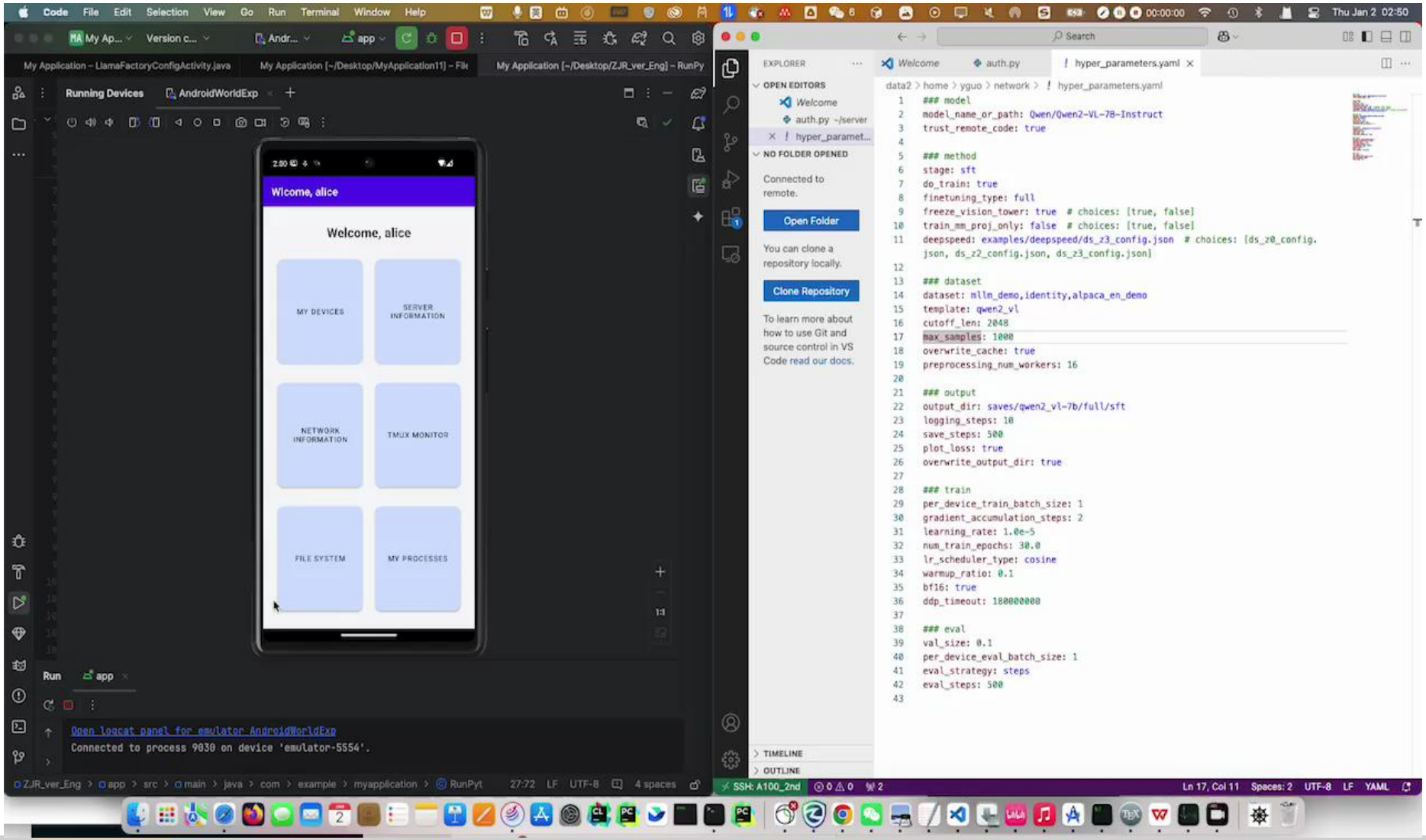
Request Tmux Session List

Enter Tmux Detail Interface

Sync Tmux Window Detail

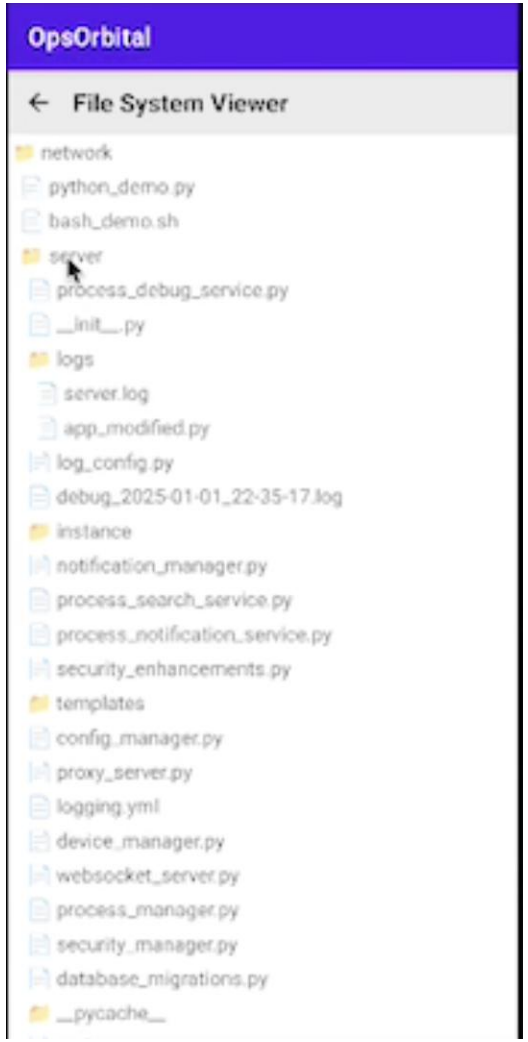
Inspection&Control: File System & File Actions <highlight>

Features: (i) File Browsing (ii) Run Python Script (iii) Run bash script (iV) Change Hyperparameters



Inspection&Control: File System & File Actions <highlight>

File Browsing



Feature: View your file system easily as a toggle list

Design:

Server: Set root directory at startup

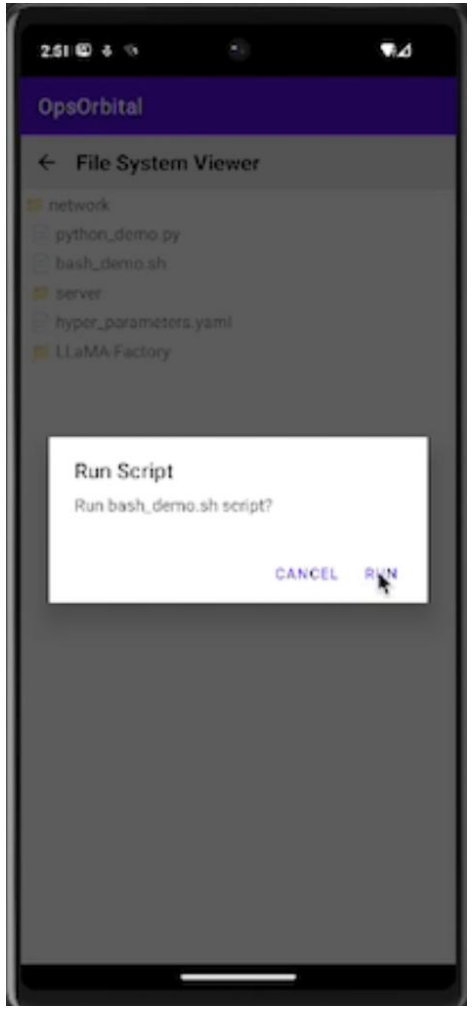
Client: Post file request signal

Server: Traverse root directory, formalize to a tree

Client: Parse the file hierarchy tree and visualize

Inspection&Control: File System & File Actions <highlight>

Run Your Script With One Click !



Client

record `click file item` action
judge specific suffix name
post structured file path&running options

Server

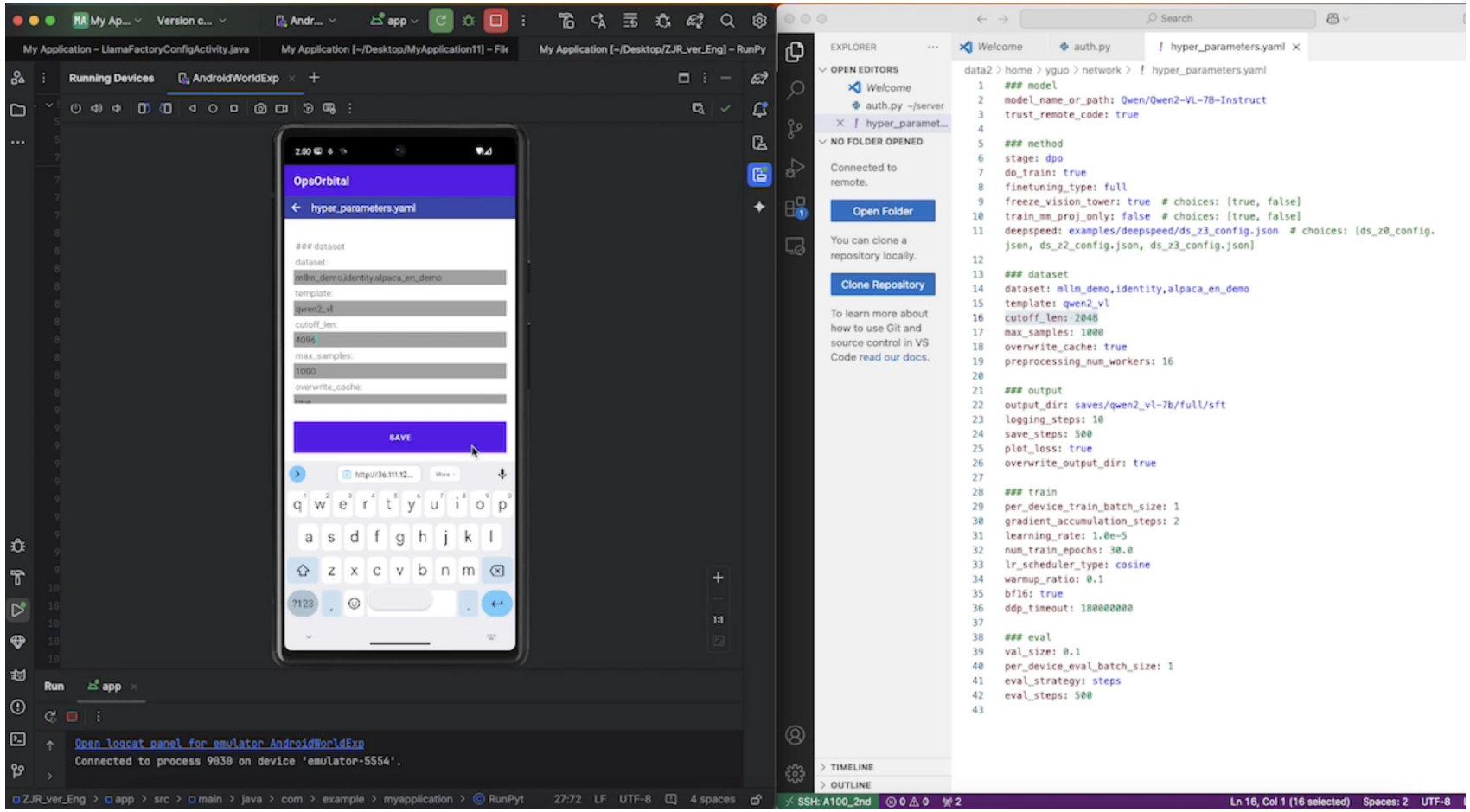
parse the running command
Open a new session to run the script

- Run Bash scripts easily in GUI? YES!
- Run Python scripts easily in GUI? YES!
- Assign specific GPUs for your script? YES!
- Automatic GPU queueing for your job? YES!!!

Inspection&Control: File System & File Actions <highlight>

Adjust Your Hyperparameters So Easily !

Feature: Viewing the training config and adjust



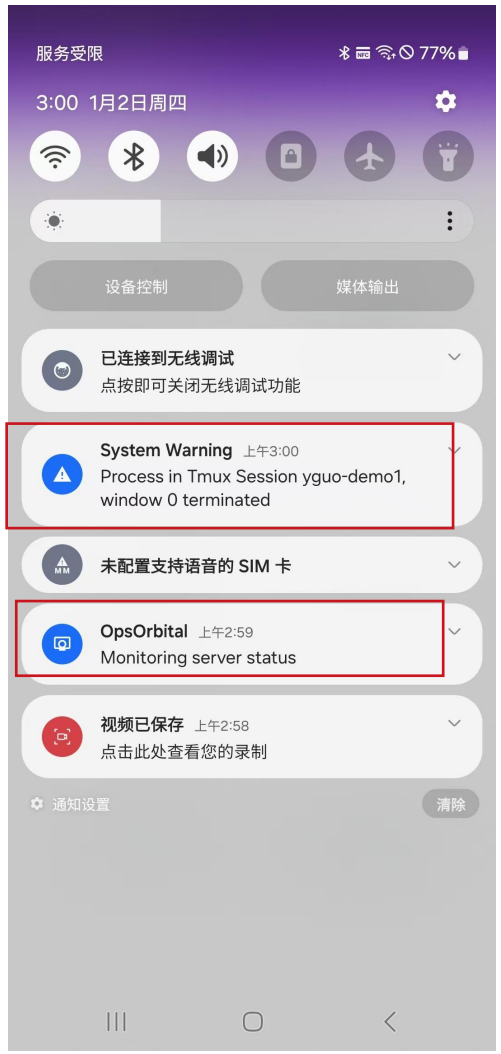
Support for V0.0.1:

Llama-Factory config files (Llama-Factory, with 37.1k github stars and accepted by ACL2024, is one of the most famous infrastructure for training LLMs, and is officially recommended by Qwen group etc)

Llama-Factory config files put all the training configs in a .yaml format. With our app, you can easily visualize and adjust these hyperparameters!

Background Monitor: May the Guard be with You

Reactive -> *Proactive*: *Make you more free than ever before!*



PermissionChecker

Check and warn about relevant system permissions

BootReceiver

Listen for BOOT_COMPLETED signal
get authentication token and start SystemMonitorService

SystemMonitorService

Periodically and automatically monitor server status with RestAPI

Unususal system status monitored / tmux process terminated -> send a high-priority notification

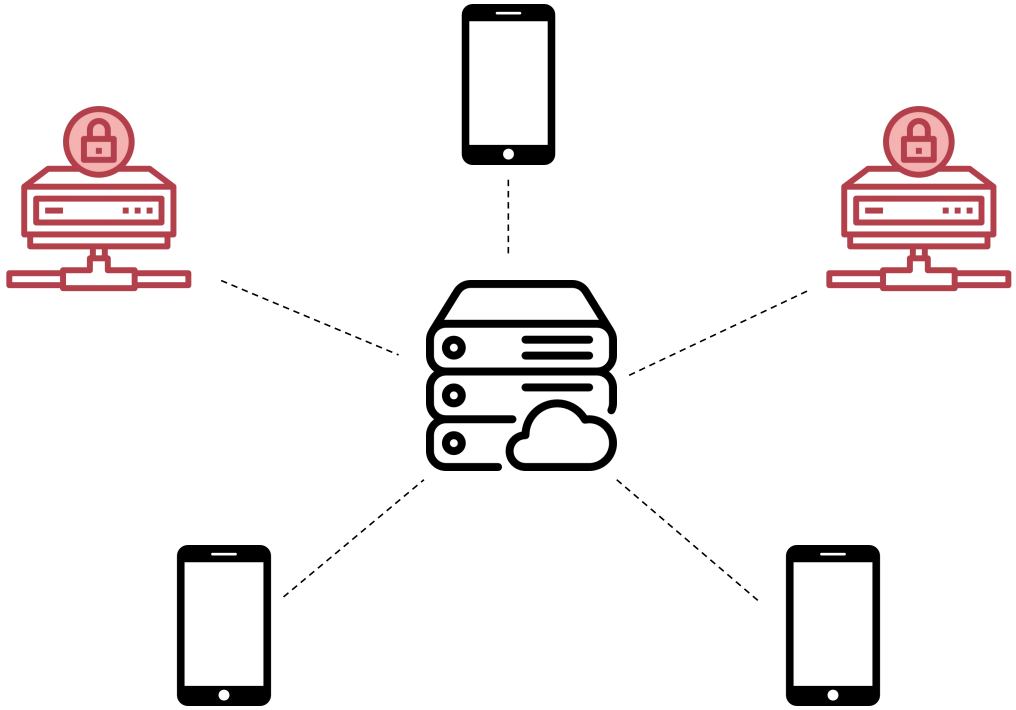
04

Future Work

Further Optimization of OpsOrbital

- Better UI Design & Visualization
- Support More Operations(data format etc)
- History Tracking & Log
- Better Linked Design
- Add Support for IOS
- Better Security (Protocol | Authentication etc)
- Unified Status Description & Less Requests

OpsOrbital–Pro: Make More Connections!



Diverse User Groups
- A unified management of all my devices

Within Same Wi-fi
- File Sync | Airdrop | Lightweight Control

Remote
- Relay Server with a Public IP
- Device Group Monitor | Notification | Control

Thank You | Happy New Year !!!