



上海交通大学

SHANGHAI JIAO TONG UNIVERSITY

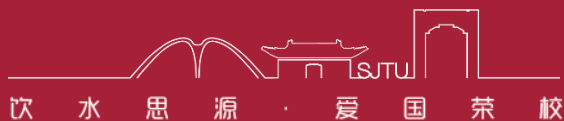
OpsOrbital: Real-Time Server Operations from Your Pocket

<https://opsorbital.github.io/>

Yuan Guo & Junran Zhang

Jan 3rd, 2024

CS3338 @ SJTU





上海交通大学
SHANGHAI JIAO TONG UNIVERSITY

OpsOrbital: Real-Time Server Operations from Your Pocket

<https://opsorbital.github.io/>

Yuan Guo & Junran Zhang



目 录



01 – Background&Motivation

02 – Related Work

03 – Design of *OpsOrbital*

04 – Future Work

01

Project Background & Motivation



I use    and more!

I train models for hours or sometimes days

Sometimes...

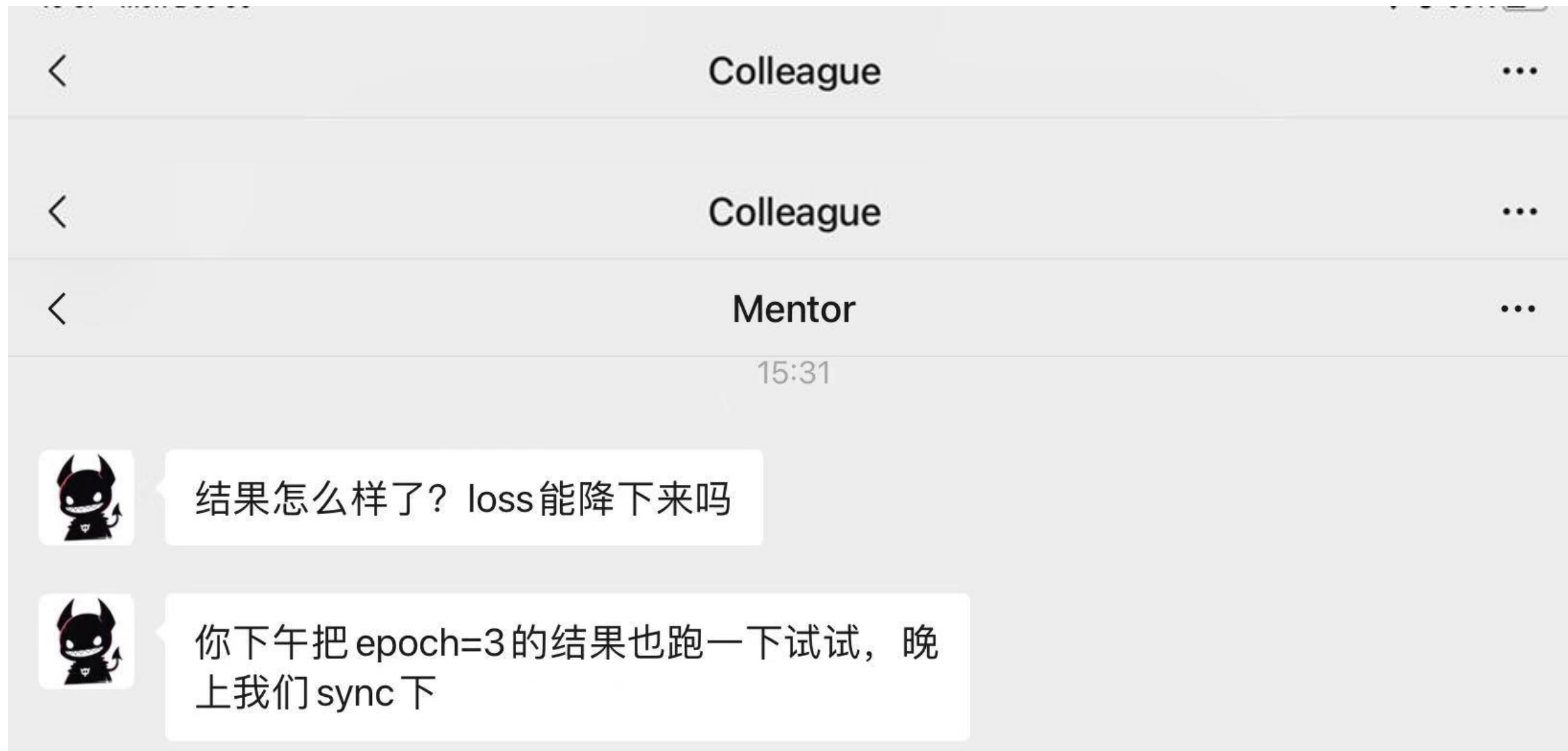
How is the status
of the server?

Is my process
completed?

Is my experiment
getting well?



Sometimes...



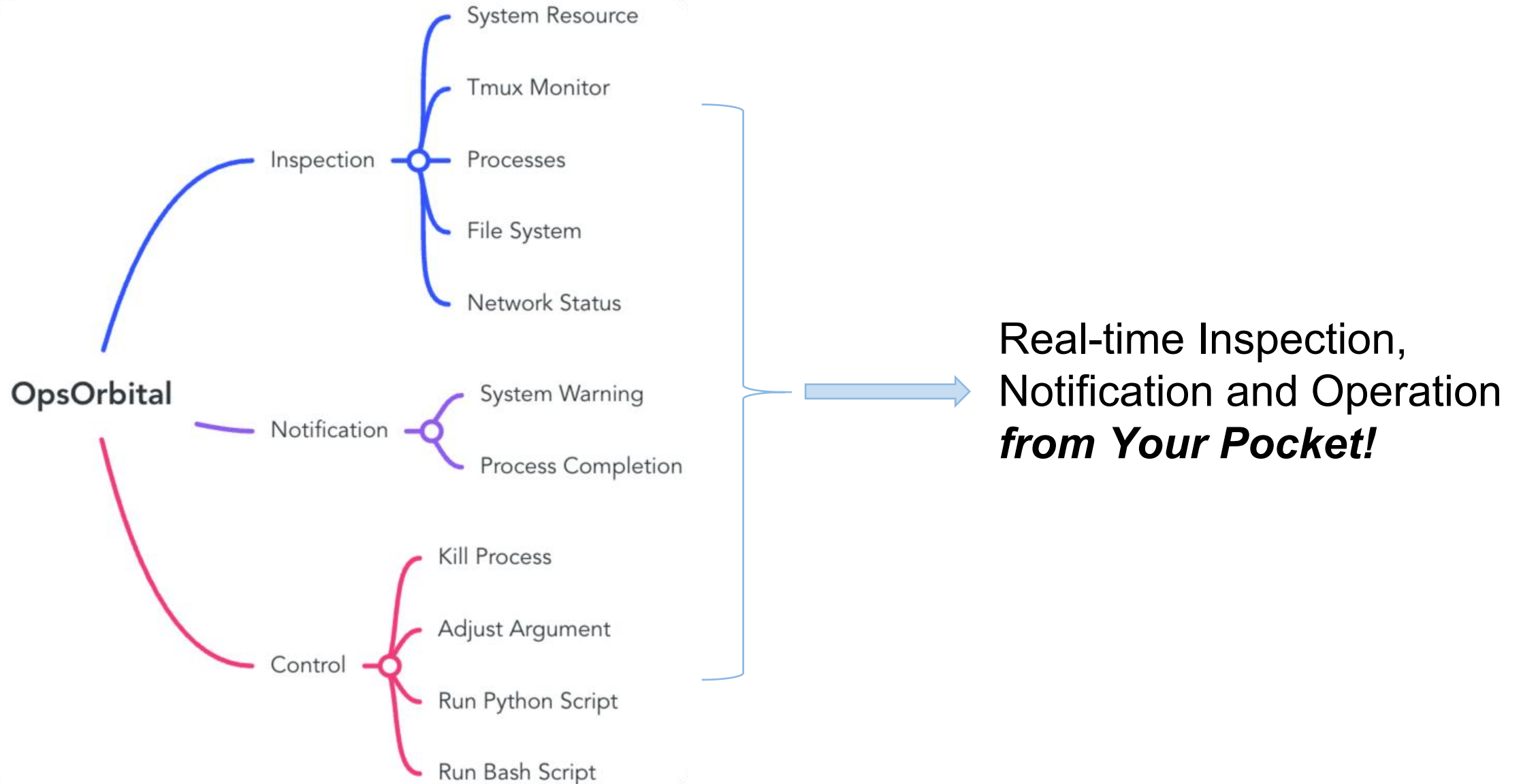
What if...

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



02

Related Work



Full Access

- Remote Desktop (RayLink etc)
- Mobile SSH

Specialist ML Monitor

- TF Watcher
- Wandb

Remote Desktop (RayLink etc)



Feature:

- Ideally, could cover most kinds of remote operations

Cons:

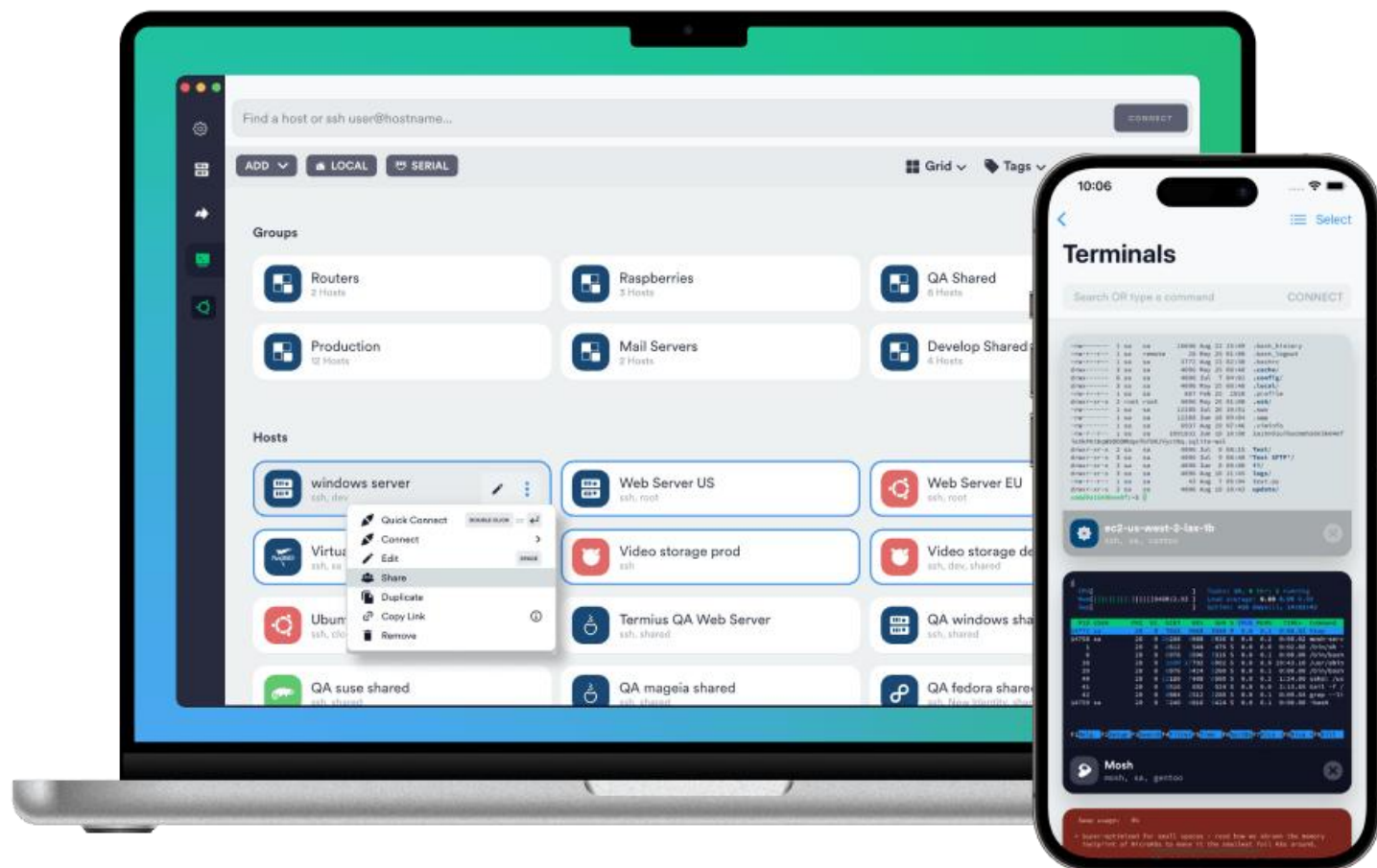
- Complex and Redundant
- Does not seem to support Linux system well

新浪众测

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?

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

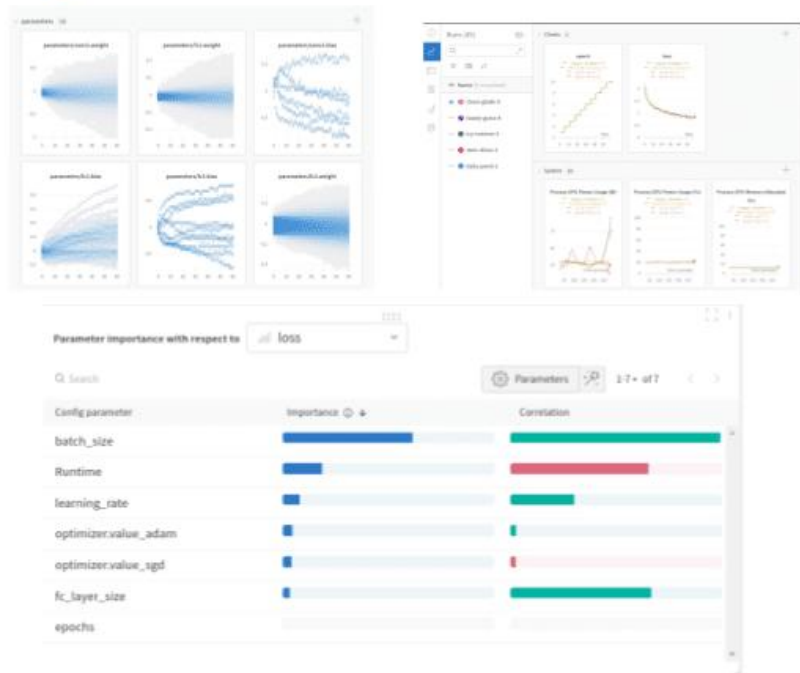


Starred 59

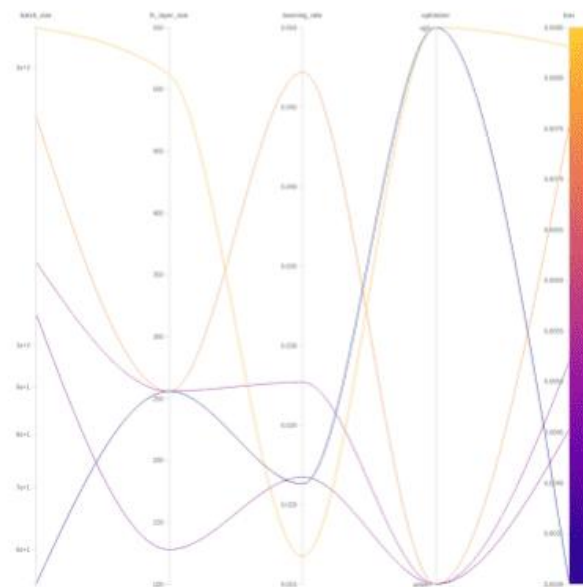


Wandb(Weights & Biases)

 Weights & Biases



 PyTorch



Feature:

- Wonderful training track
- Nice ecosystem

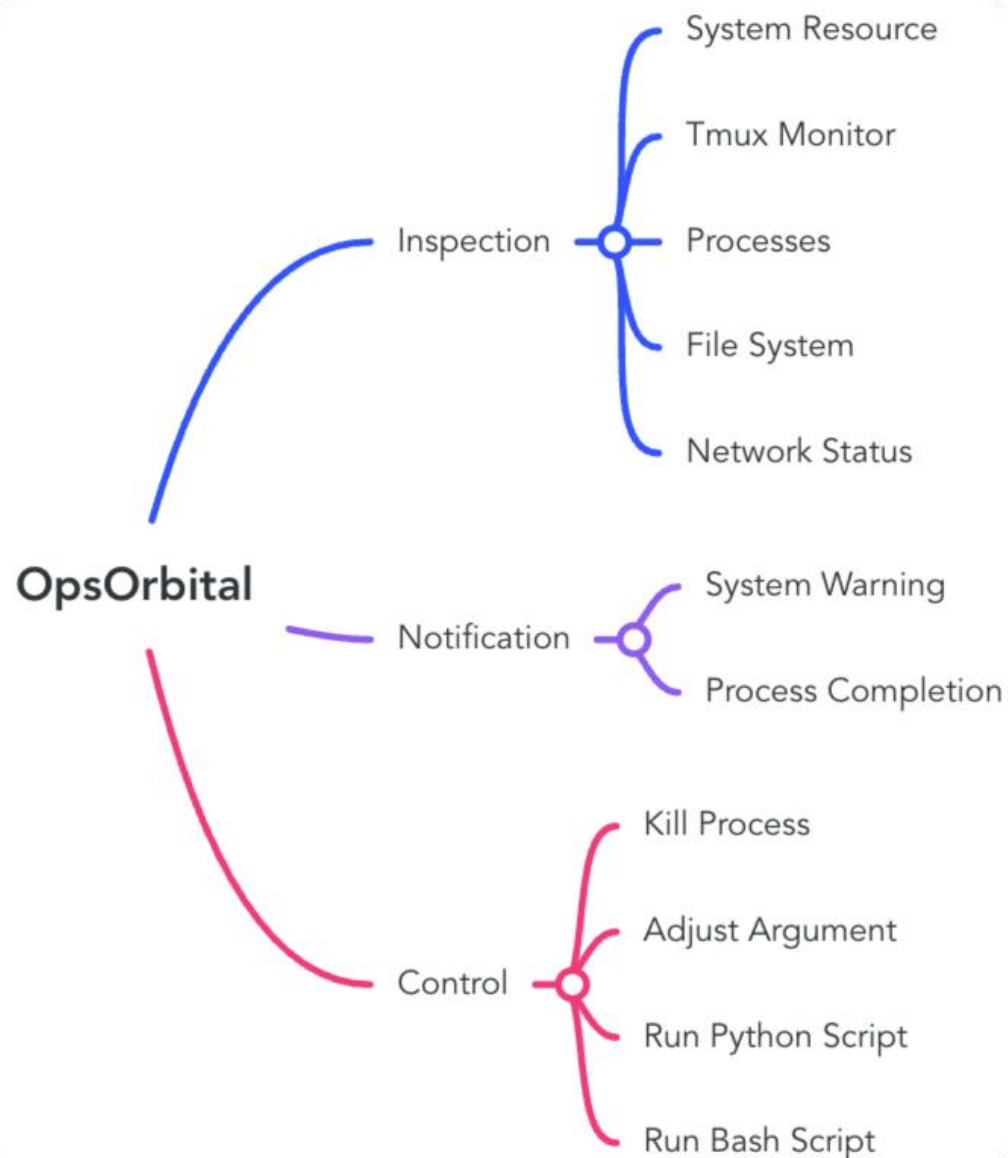
Cons:

- Tracking only, more like a data analysis app
- Very limited remote control

03

Design of OpsOrbital





Our Core Idea:

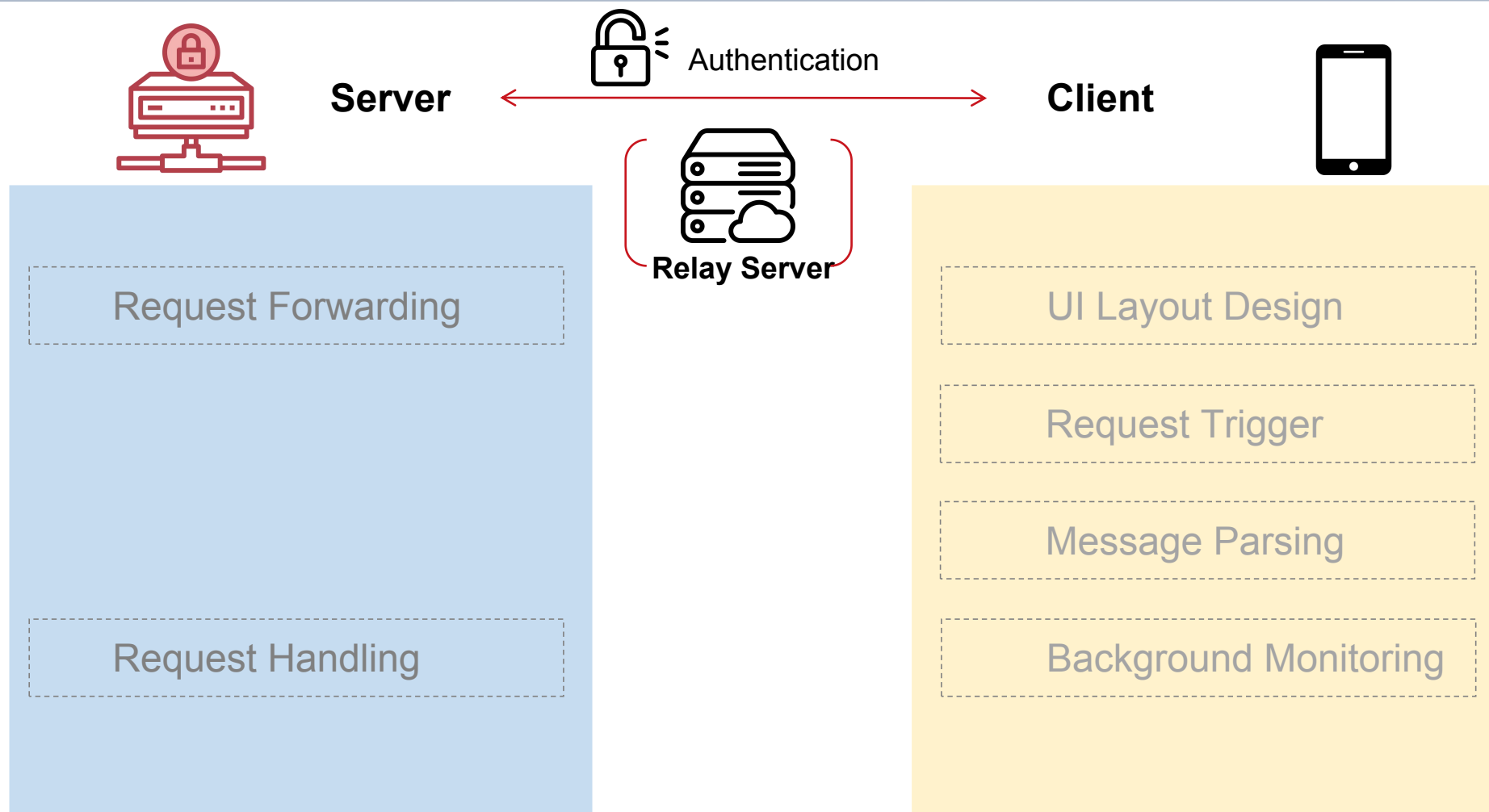
Convenient

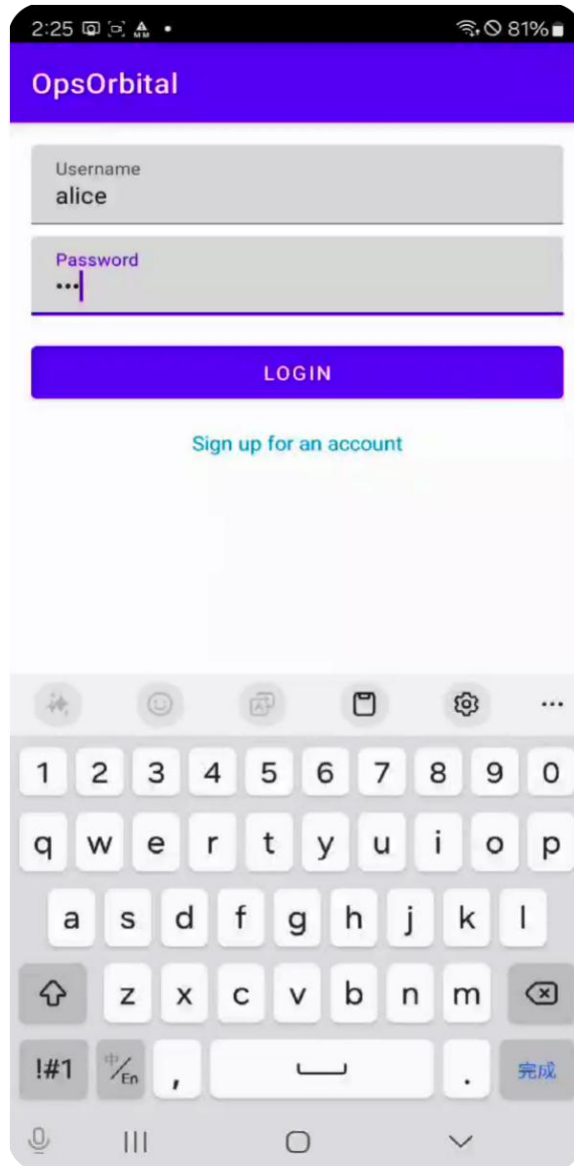
LightWeight

Scenario-Specific

User-Friendly

Beyond Watch-Only:
Easy Control Makes Truly Useful Product





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



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



Client:

- Send request for server info
- Use OkHttp to avoid blocking main thread
- Parse the info and update UI

Server:

- Get network details using `psutil.net_if_addrs` (Interface Name, IP Address, Subnet Mask)
- Refresh Button: Update



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

系统监控 -
iZbp1idw6pppp4066ydec5Z

进程名	PID	CPU(%)	内存(%)
python	7267	root 22.60 %	2.11%
AliYunDunMo nitor	27070	root 7.50 %	3.57%
java	1939	root 0.00 %	14.04 %
python	7256	root 0.00 %	2.02%
BT-Panel	15388	root 0.00 %	1.96%
dockerd	1068	root 0.00 %	1.48%
jsvc	27573	www 0.00 %	1.45%

总CPU使用率: 4.36% 总内存使用率: 47.90%

&

Terminate certain process easily

Confirm Process Killing

Terminate the following process?

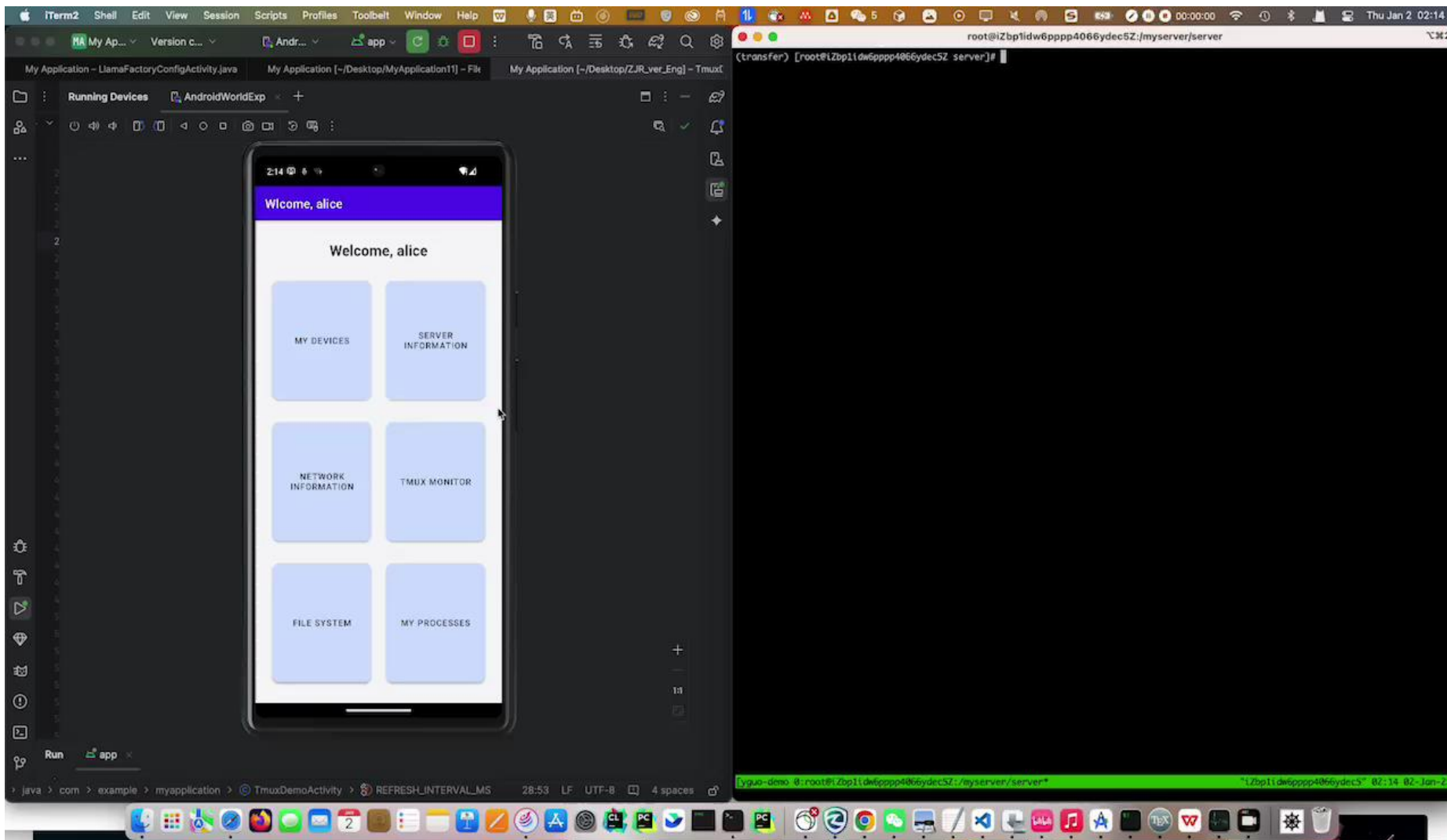
Process Name: top
PID: 20830

CANCEL CONFIRM

Inspection&Control: Tmux



Real-Time Window Monitor & Shortcut for Process Termination



Enter Tmux
Table Interface



Request Tmux
Session List



Enter Tmux
Detail Interface

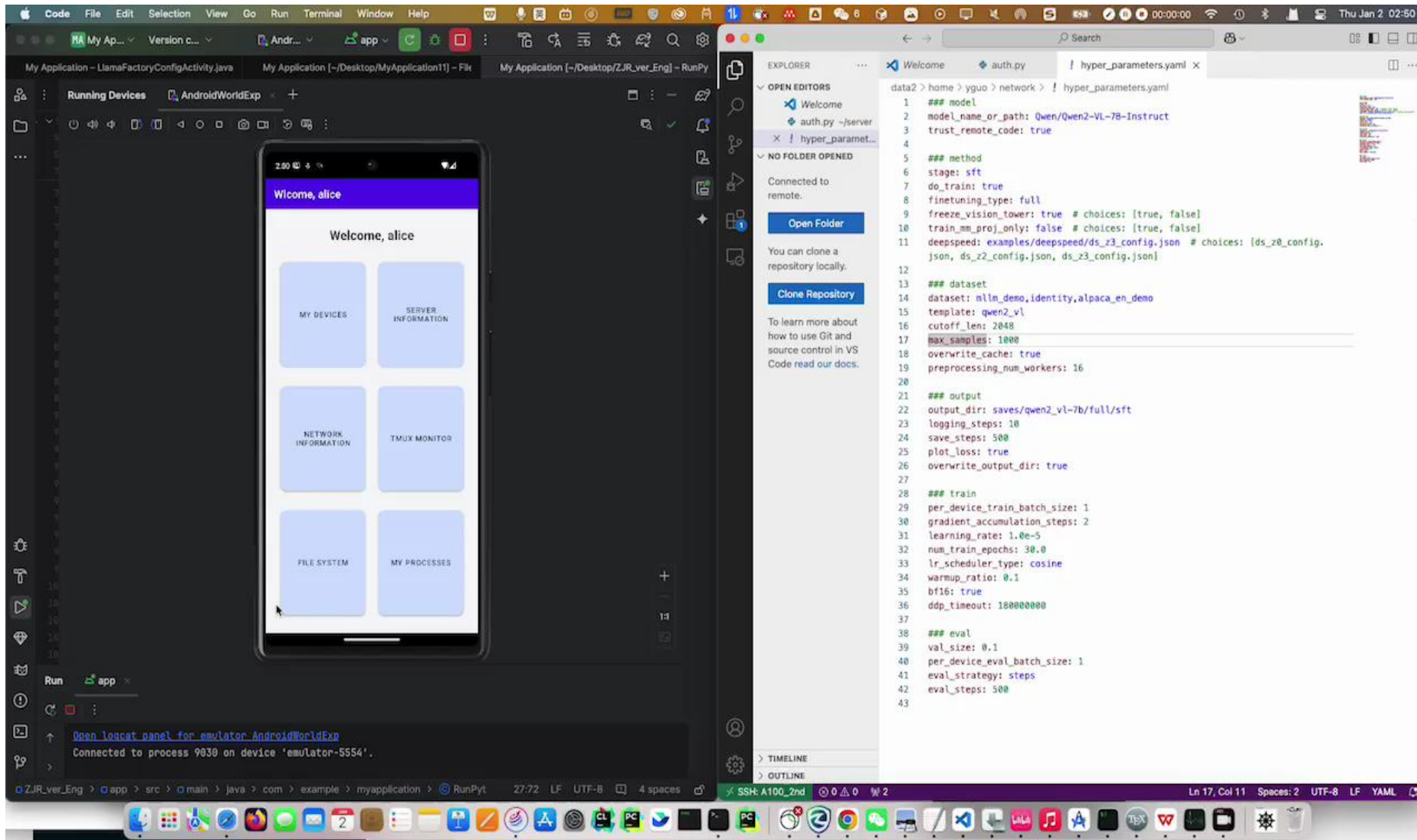


Sync Tmux
Window Detail

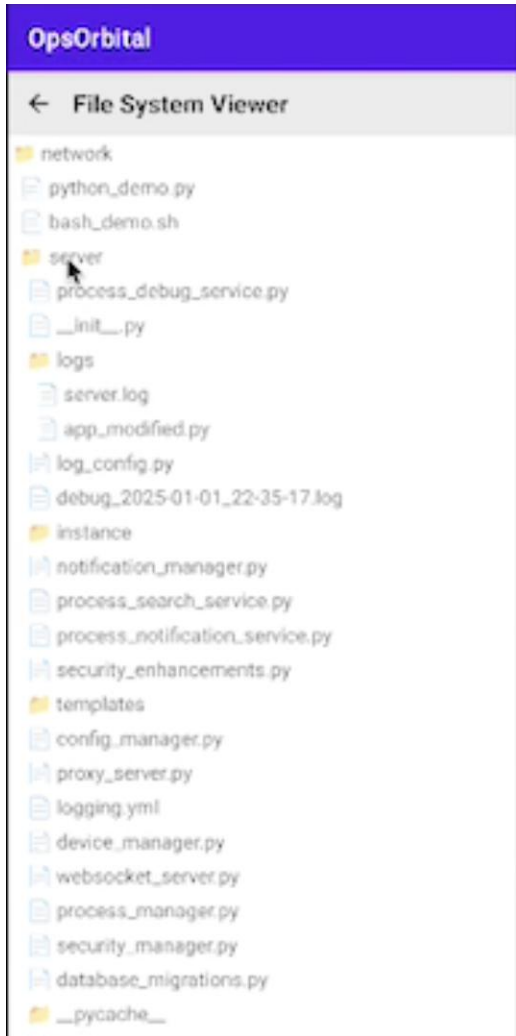
Inspection&Control: File System & File Actions <highlight>



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



File Browsing



Feature: View your file system easily as a toggle list

Design:

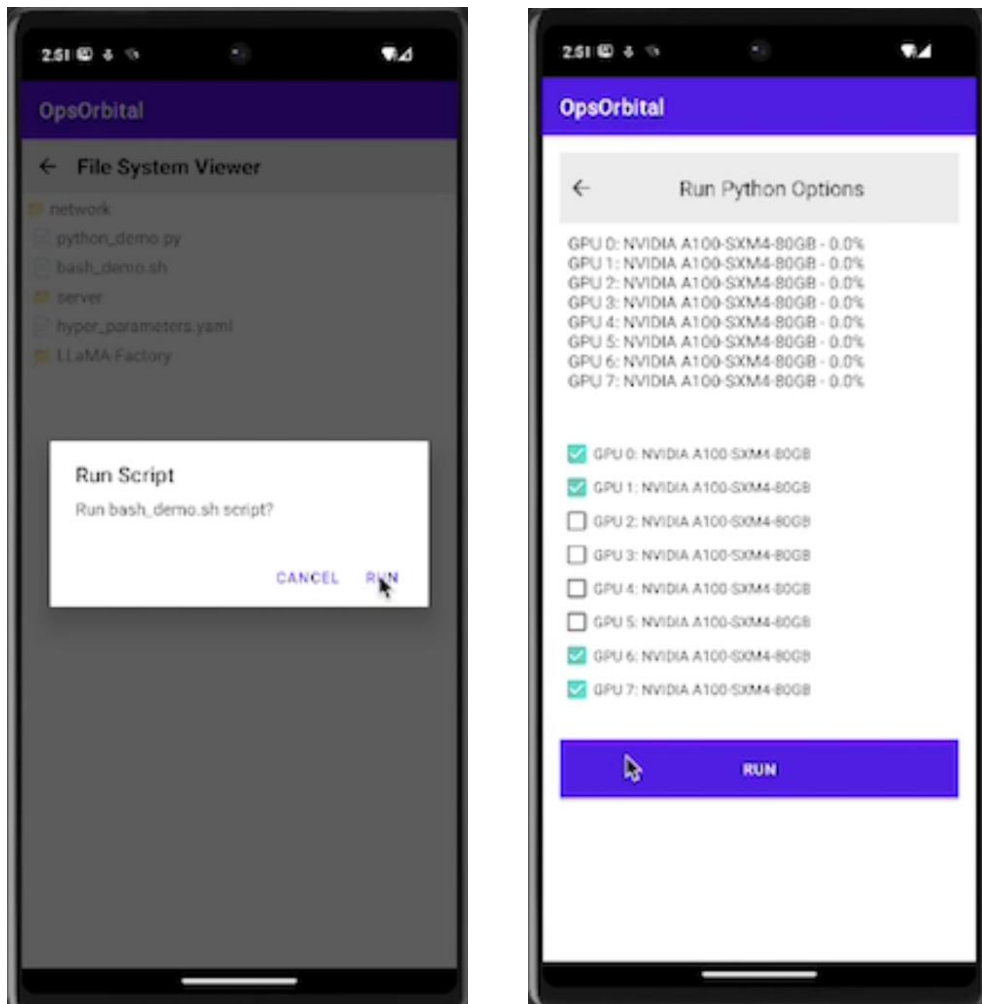
Server: Set root directory at startup

Client: Post file request signal

Server: Traverse root directory, formalize to a tree

Client: Parse the file hierarchy tree and visualize

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

YES!
YES!
YES!
YES!!!

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

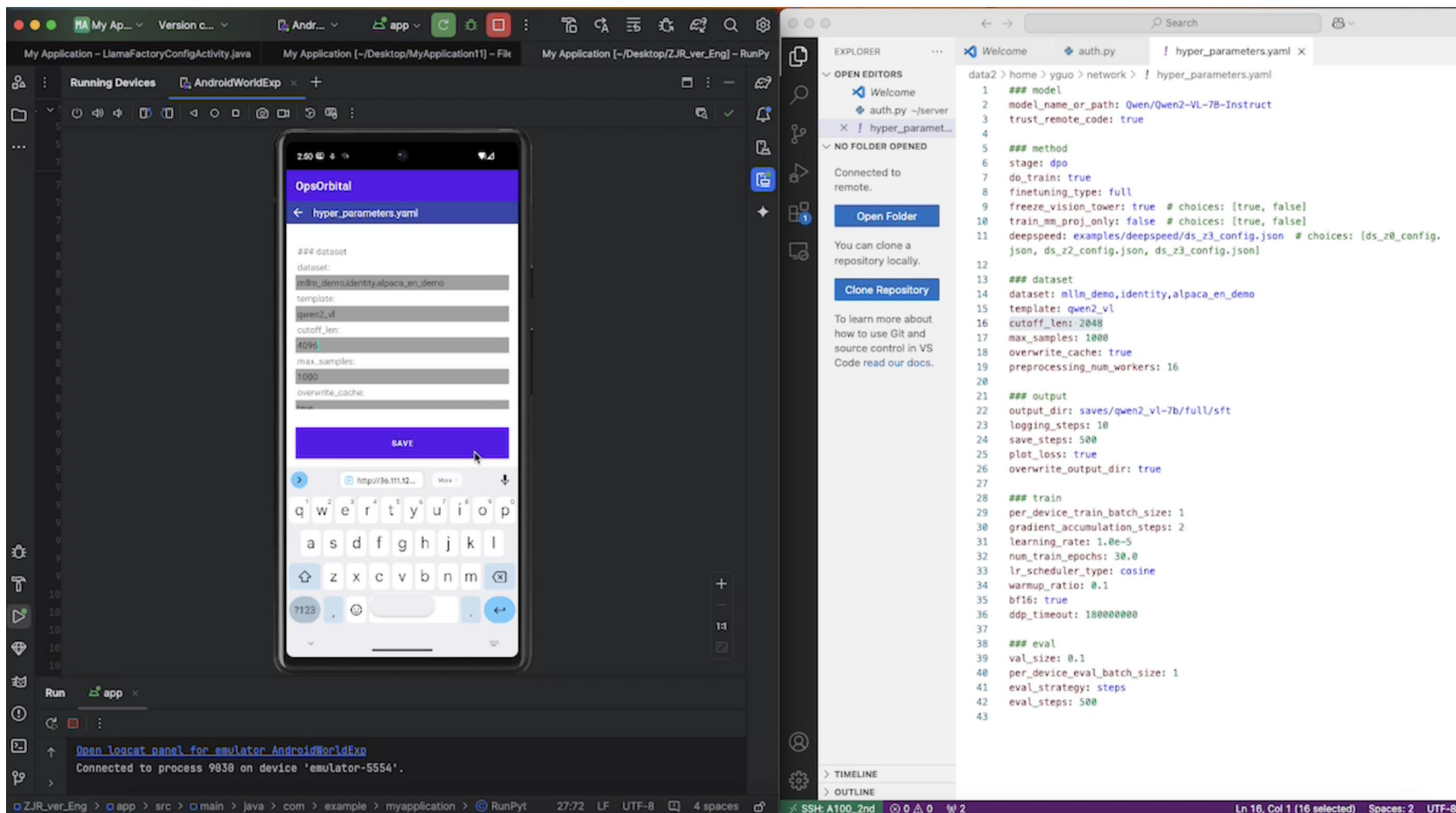


Adjust Your Hyperparameters So Easily ! Feature: Viewing the training config and adjust

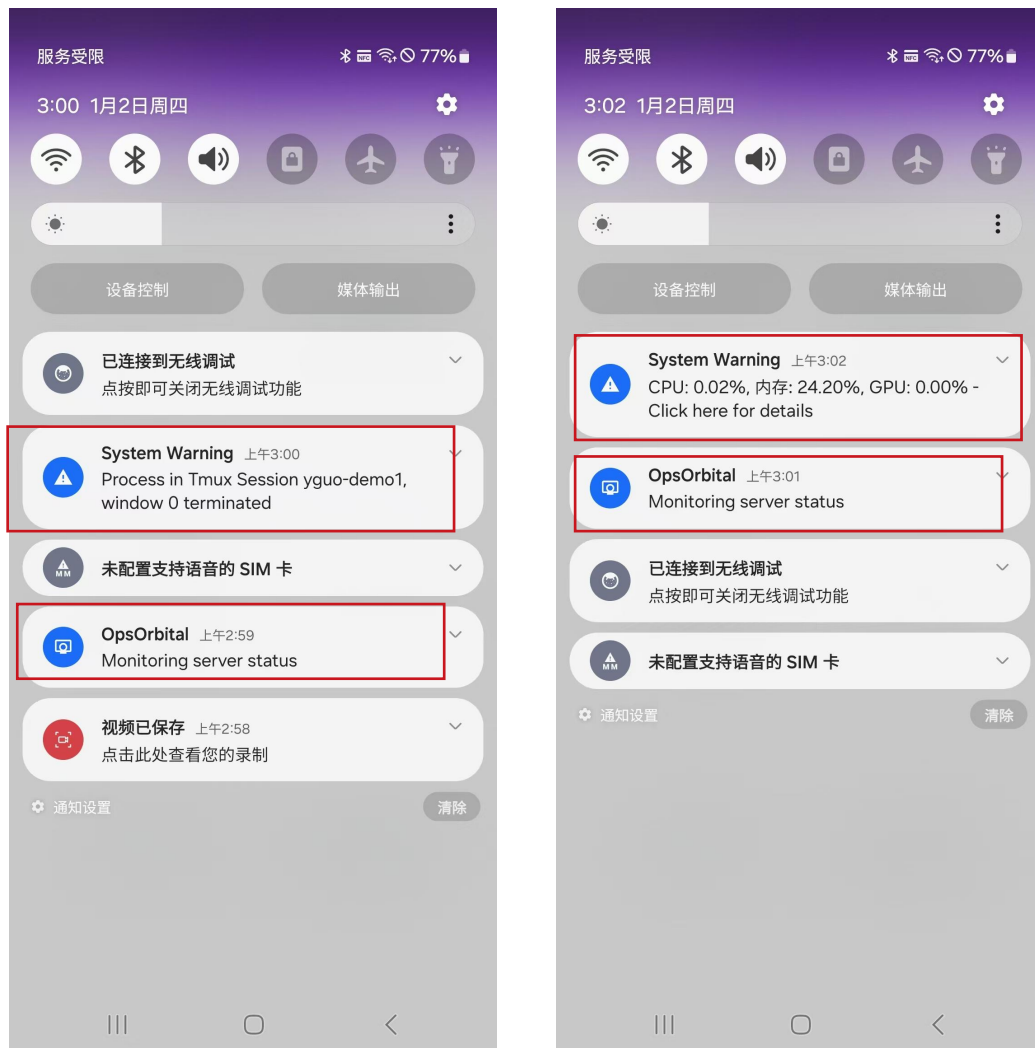
Support for V0.0.1:

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!



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

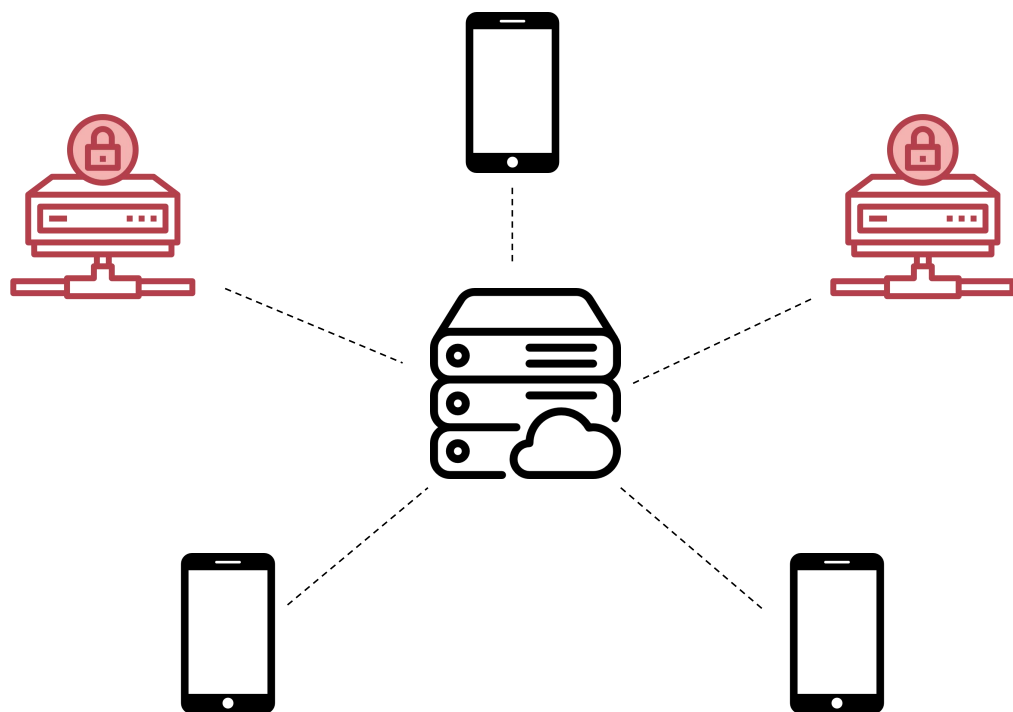
Unusual system status monitored / tmux process terminated -> send a high-priority notification

04

Future Work



- ① **Better UI Design & Visualization**
- ① **Support More Operations(data format etc)**
- ① **History Tracking & Log**
- ① **Better Linked Design**
- ① **Add Support for IOS**
- ① **Better Security (Protocol | Authentication etc)**
- ① **Unified Status Description & Less Requests**



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

