Multi-client Android for In-Vehicle Infotainment

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Agenda

- Multi-Display in Stock Android
  - Single user at one time
  - Capabilities and limitations
- Multi-Display in Car
  - Several displays for driver and passengers
  - Potential solutions
- Overview of Intel Multi-Client Android POC
  - Changes, architecture and demo
  - Pros & cons VS other solutions

Multi-Display in Stock Android

Single User at One Time

- Android was born for mobile phone
- Only one display on the device
- All features are designed with one user in mind

Limited Multi-Display Capabilities

- Mirror or Clone mode
  - Default behavior
- Extend mode
  - Show a dialog on secondary display with Presentation API
  - Launch activity on secondary display with new Android O API

Mirror

Extend

Technical Details

- Support two physically connected displays
- API is available to show a dialog or launch activity on secondary display
- Only one activity is in resumed state globally
- Only one window has the input focus globally
- Only primary display support touch, IME, etc
- System UI is available for primary display only
- Same app can run concurrently with Android for work and multi-window enabled

Multi-Display in Car

Head Unit (HU)

- HVAC
- Navigation
- Radio
- Phone
- Music

Rear Seat Entertainment (RSE)

- HVAC
- Video
- Music
- Game
- Map
- Conference

Potential Solutions

- Single instance of Android powers both HU and RSE displays
  - Simple experience for RSE
    - Video playing only
  - Advanced experience for RSE
    - Support concurrent input on HU and RSE
    - Multiple instances of same app can run on HU and RSE
    - Personalized experience for each user
    - Interaction or sharing between HU and RSE
- HU and RSE runs separate Android instances

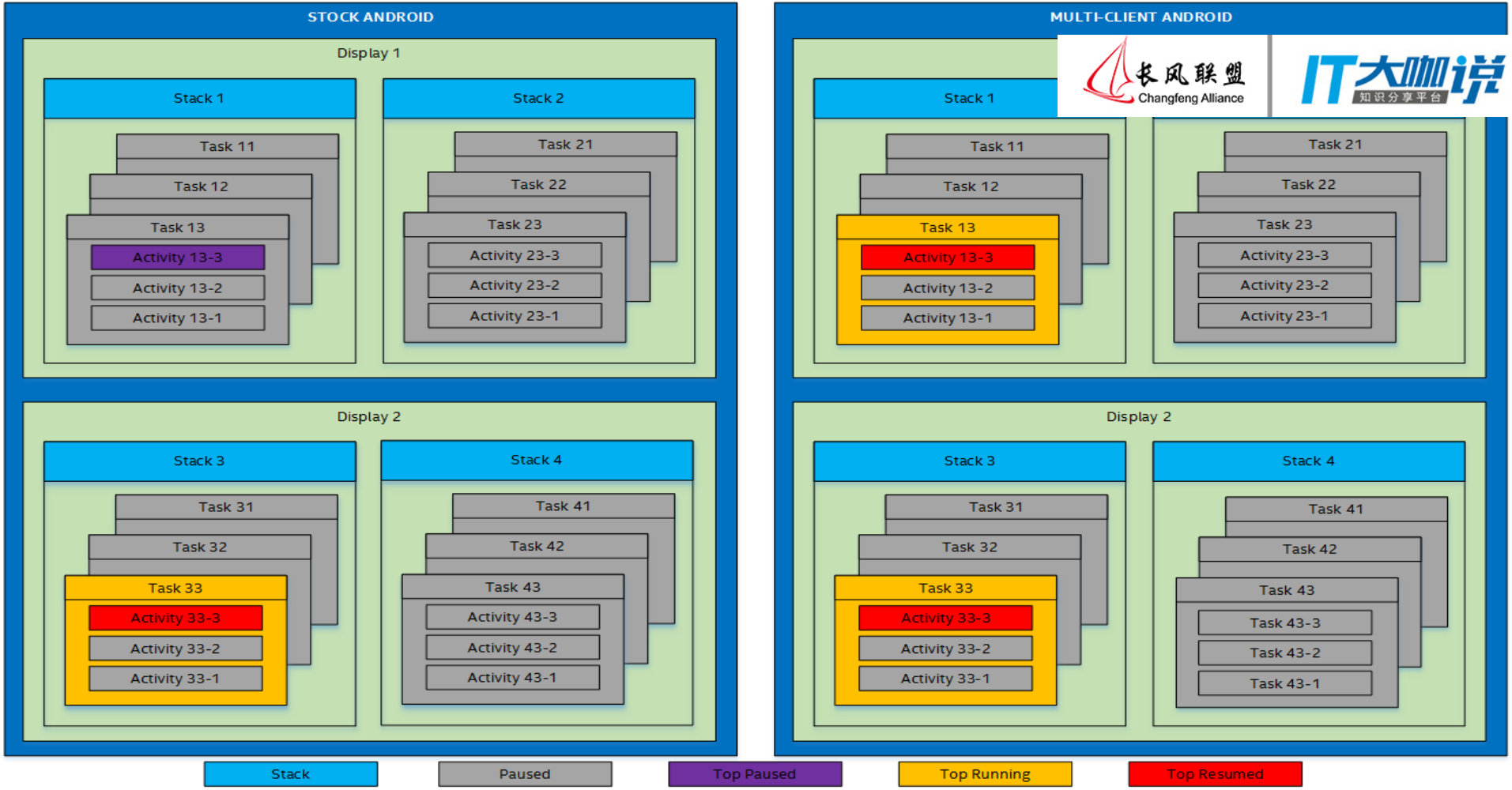
Overview of Intel Multi-Client Android POC

Single instance of Android with advanced RSE experience

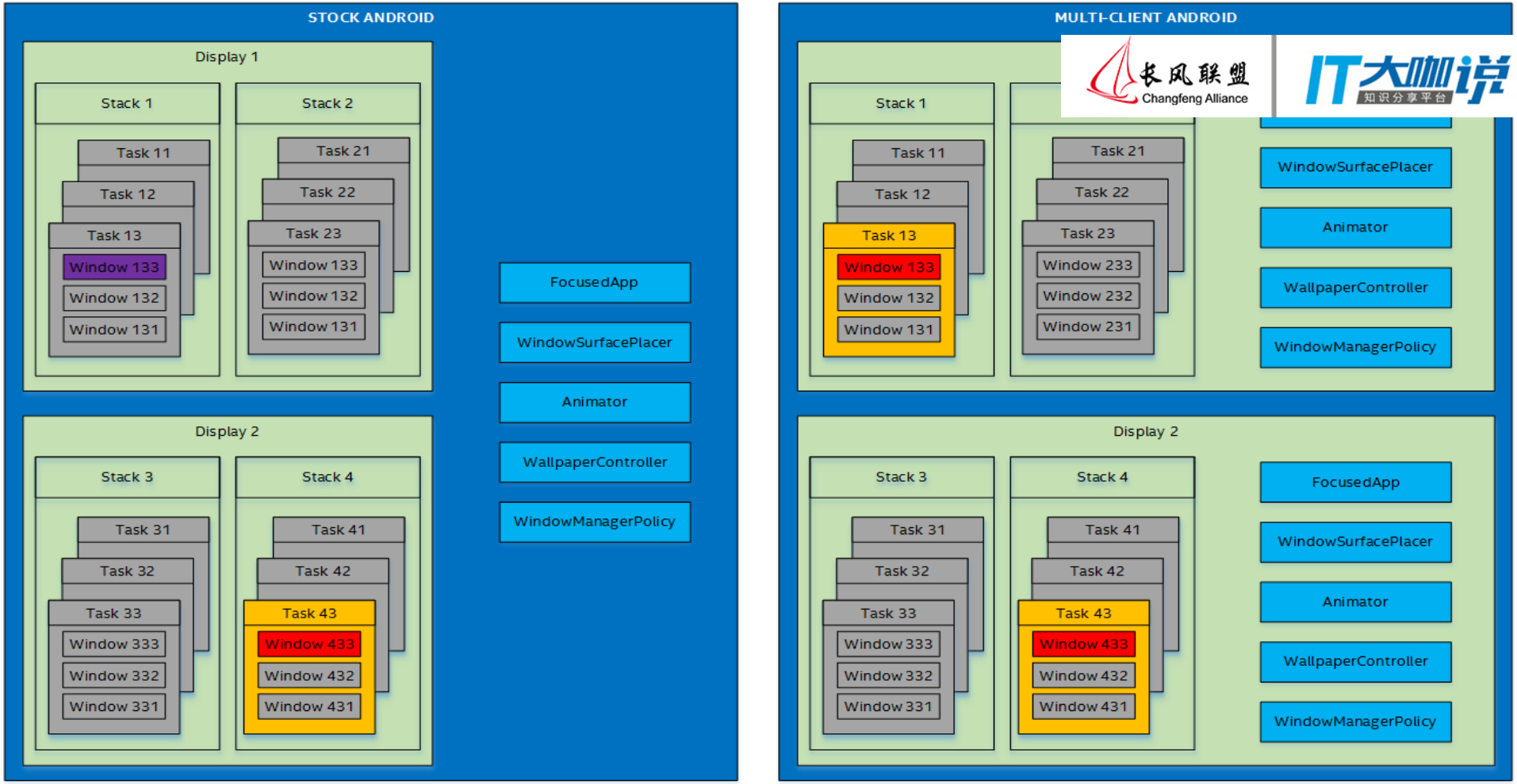
Major Changes

- One resumed activity per display
- One focused window per display
- One user per display
- *One IME per display*
- *One SystemUI per display*
- *Three display support*

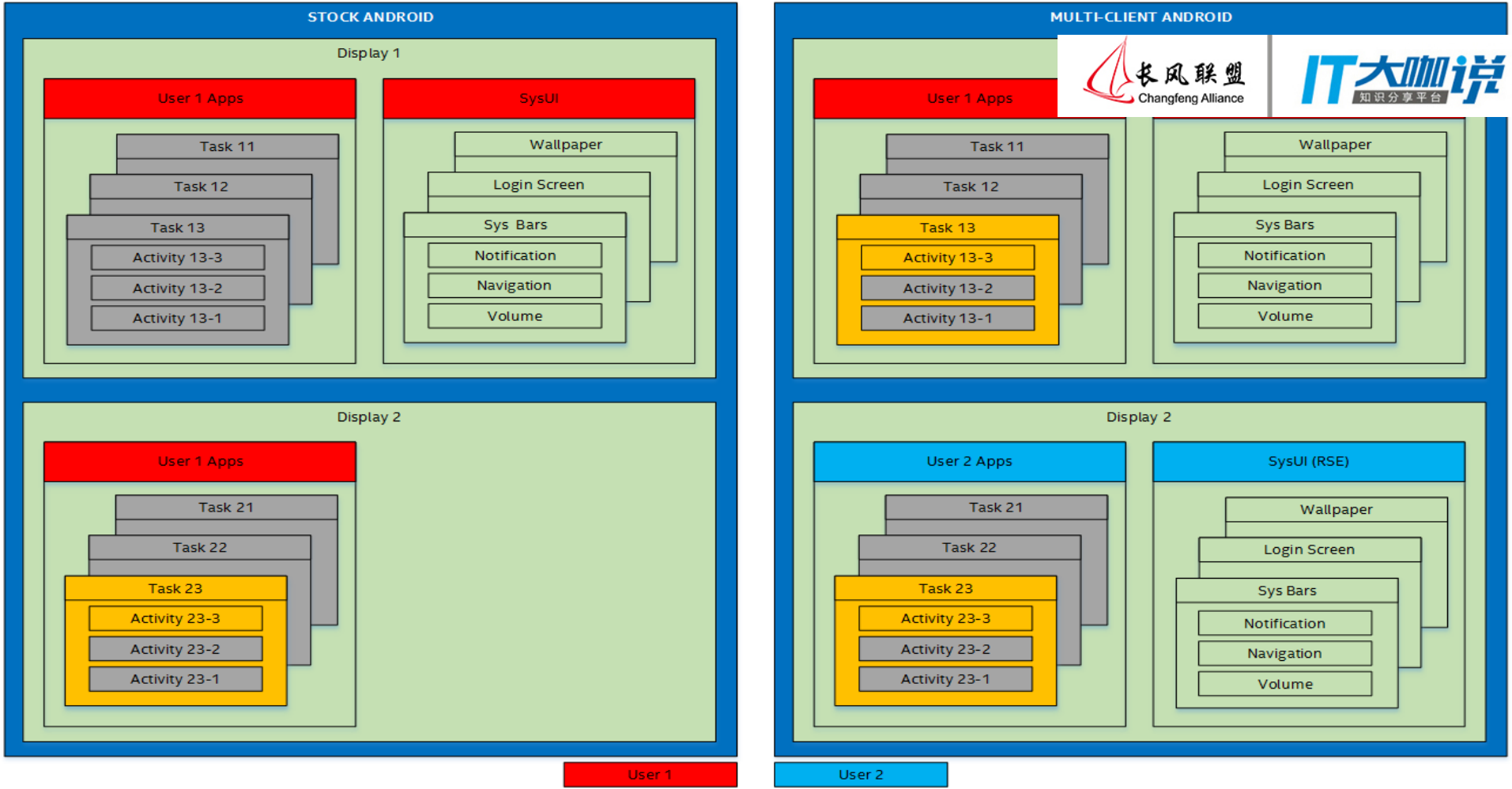
One Resumed Activity Per Display



One Focused Window Per Display



One User Per Display

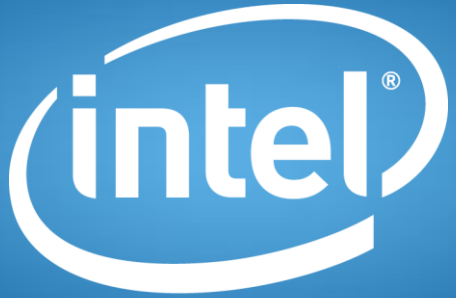


Pros and Cons

	Single instance with simple RSE	Single instance with advanced RSE	Multiple instances of Android
User Experience	Good	Best	Better
Hardware Cost	Low	Low	High
Software Cost	**Low**	**High**	**Low**
Security Risk to HU	Low	High	No risk
OS Upgrade Effort	Low	High	Low

Demo Video

Q & A



Software