HACMony: Automatically Detecting Hopping-related Audio-stream Conflict Issues on HarmonyOS

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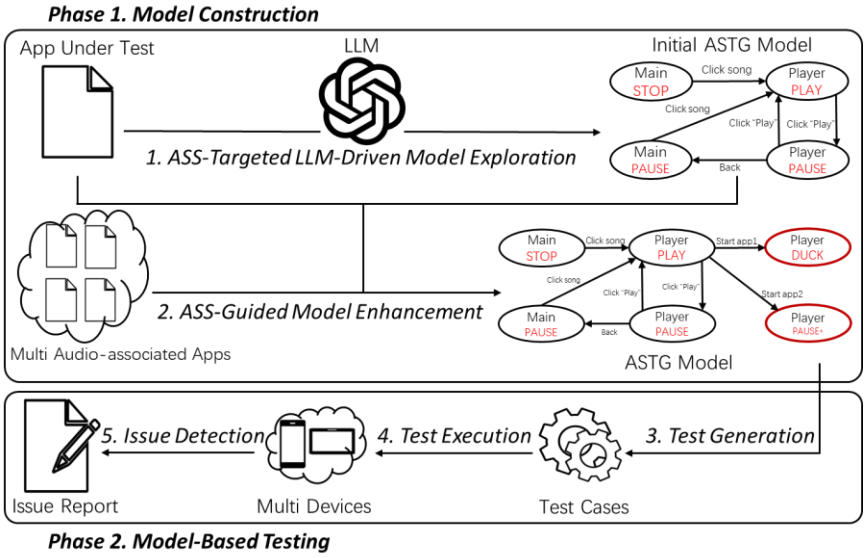
Problems & Ideas

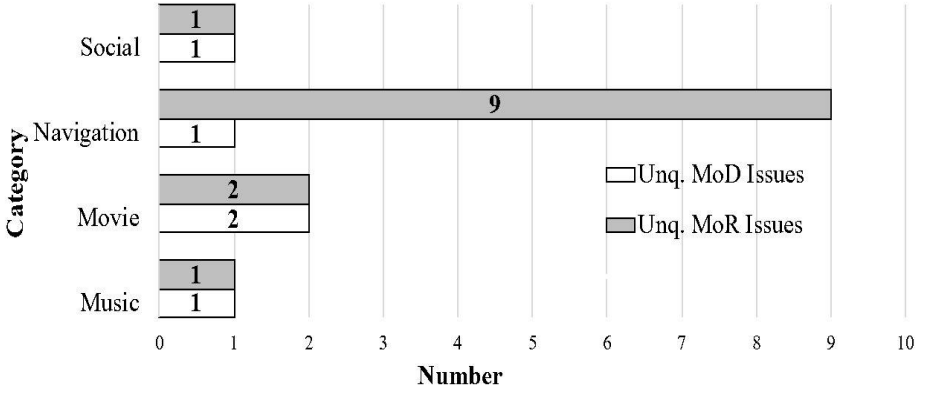
- Problems of multi-device application hopping in HarmonyOS:
  - Cross-device audio stream hopping is prone to conflicts during playback.
  - The semantics of HarmonyOS's app-hopping mechanism is unclear and effective testing methods for multi-app scenarios remain unaddressed.
- Ideas: An automated detection approach that is driven by formalized semantics to identify HarmonyOS audio-stream conflicts in app-hopping.

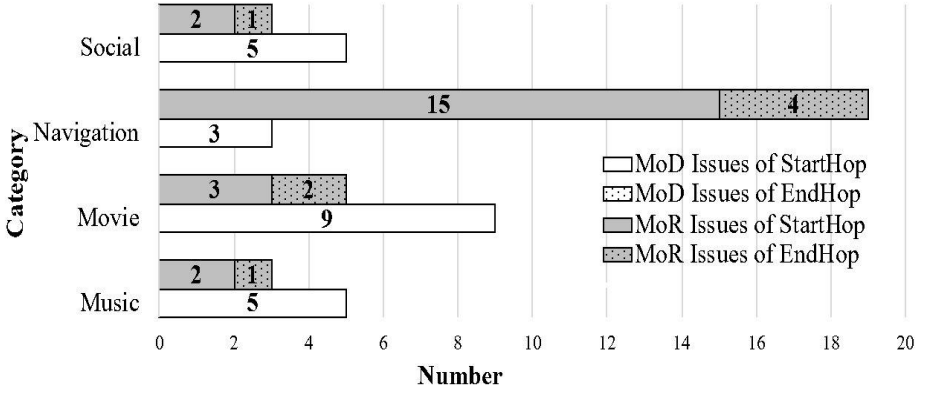


An overview of the HACMony's architecture and workflow. Its two key phases are Model Construction and Model-Based Testing.

Main Contributions

- Contributions:
  - Present the first formal semantics of the HarmonyOS app-hopping mechanism, which serves as a foundation for HAC issue testing;
  - Design the ASTG model to describe the transitions of ASSs in HarmonyOS apps and propose an LLM-driven dynamic exploration approach to construct ASTG models;
  - Summarize two typical types of HAC issues, namely MoD and MoR, and analyze their possible causes.





HAC issue types versus application categories; MoD issues predominantly in Video apps, MoR issues in Navigation apps.
HAC detection rates versus test case types; MoD issues identified by StartHop, minority of MoR issues by EndHop.