Short Paper:
Experiences on the Implementation of a Cooperative Embedded System Framework

Cláudio Maia, Luís Nogueira and Luís Miguel Pinho

JTRES 2010, Prague, Czech Republic
August, 19-21, 2010

CISTER Research Centre in Real-Time Computing Systems
FCT Research Unit 608

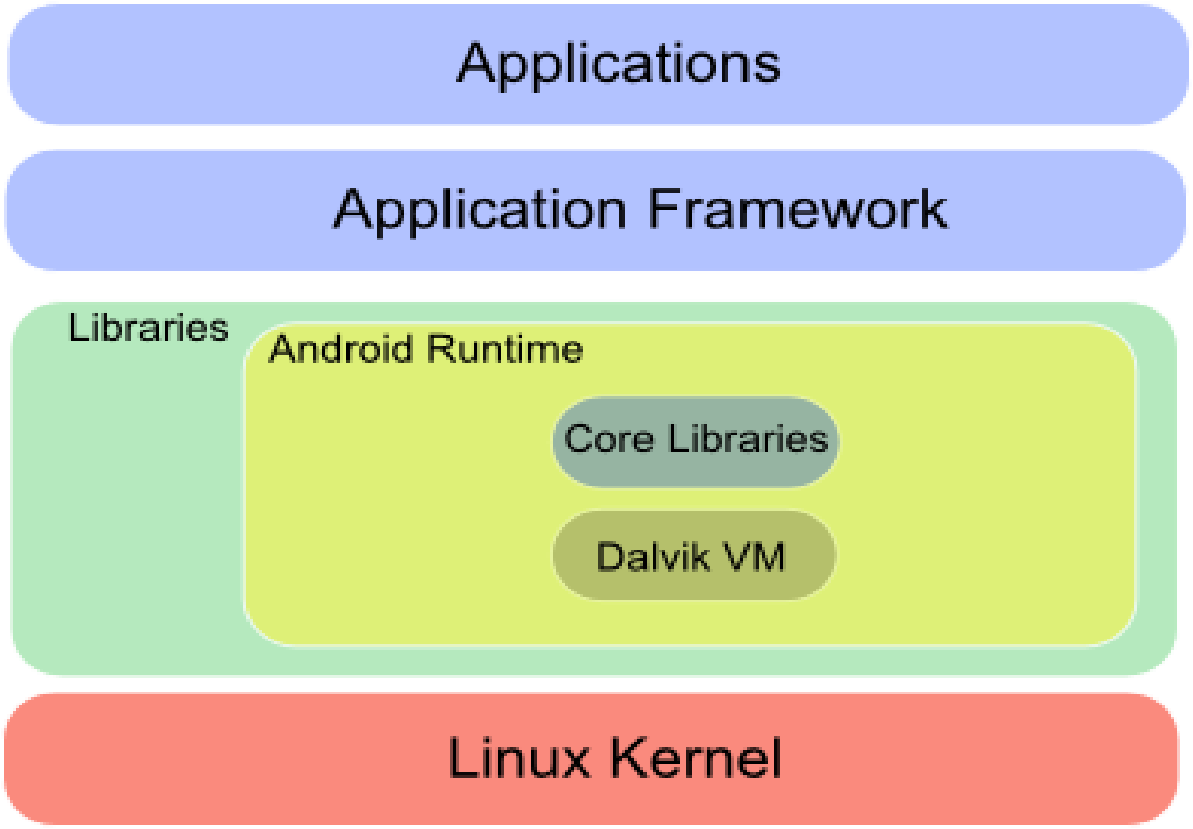
Agenda

- Context
- What is Android?
- Possible Directions
- Chosen Direction & Challenges
- Conclusion & Future Work

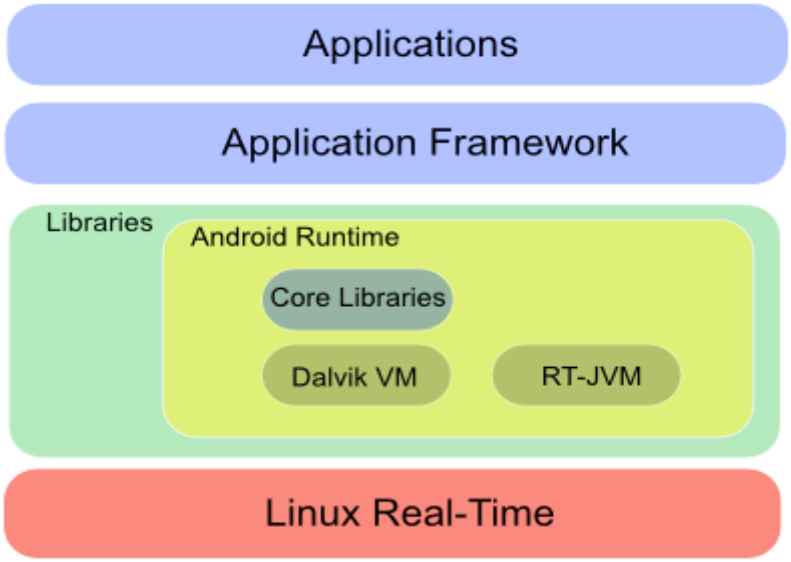
Context

- CooperatES Framework
  - QoS-aware framework which aims at facilitating the cooperation between nodes when a particular set of QoS constraints, associated with a service, cannot be satisfied by a single node
- Why Android?
  - Increasing relevance of Android in the mobile industry
  - Open-source platform
    - Linux kernel based architecture
  - Possibly a target to ERTS
- The paper presents the motivation and key challenges concerning the implementation of the framework in Android

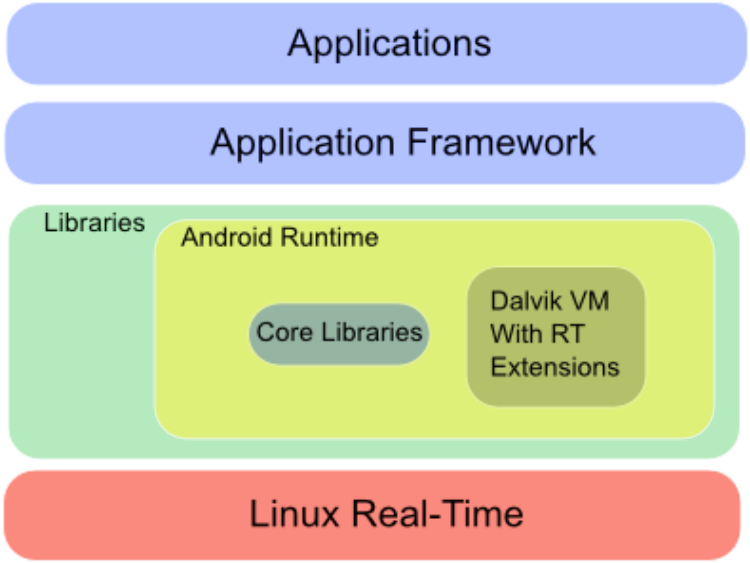
What is Android?



Possible Directions



- OS Level
  - Predictability and Determinism
- VM Level
  - RT Scheduling
  - Bounded Memory Management
- Android Specificities must be implemented



- OS Level
  - Predictability and Determinism
- VM Level
  - Extension of DVK with RTSJ
  - RT Objects
- Release cycles of the platform

Chosen Direction & Challenges

- The first proposed direction is considered the one that causes less impact in the system as a whole
  - Android apps and QoS apps can coexist
- Scheduling operations at OS level
  - Handle each VM with the correct priority is a must
    - Achieved through a mapping mechanism of tasks
- Memory Management
  - Mechanisms to address system resource saving
    - Memory Management Abstraction Layer
    - Single Heap for both VMs
    - Intelligent Garbage Collection mechanism
- Synchronisation Mechanisms (If necessary)
  - Communication between each VM's threads

Conclusion & Future Work

- Android was chosen as a testbed for the CooperatES Framework
  - Potential target for ERT environments
    - Industry would benefit from it
- Not a RT platform out of the box
  - Proposed Directions fill this gap
- Undergoing work
  - Implementation of the framework
    - QoS mechanisms
    - Scheduling
  - Dynamic Memory Management research

Thank You!

Questions?