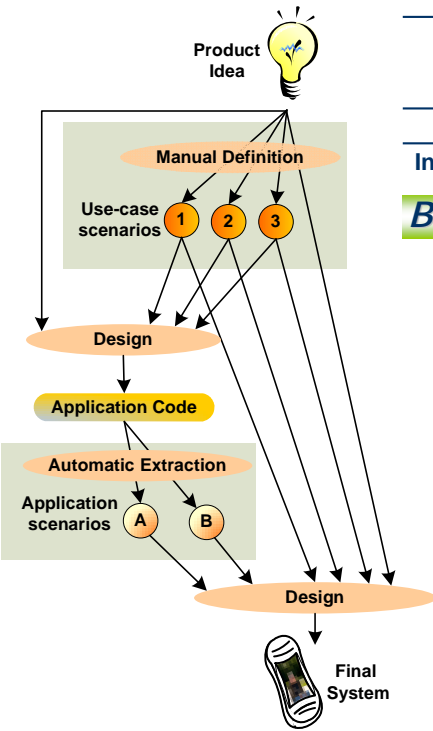


Energy Reduction for Streaming Oriented Embedded Systems Using Application Scenarios†

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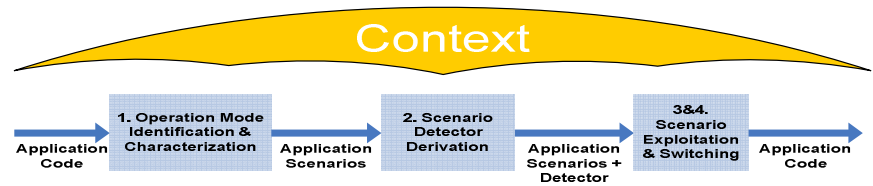
Scenario Based Design for Embedded Systems [1]



	Use-case Scenarios	Application Scenarios
Definition	A story that describes in an early development phase the use of a future system.	A run-time detectable set of operation modes that are similar in resources needs.
Perspective	User	Resource Usage
In Embedded Systems Design	Used for a long time	Not really exploited yet

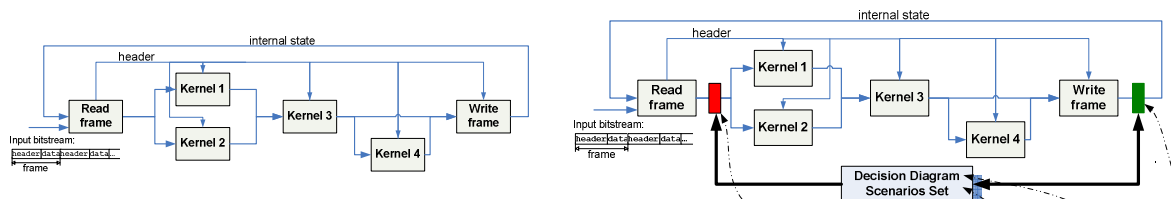
Basic Methodology for Exploiting Application Scenarios

Goal: Given an application, to exploit at design-time its possible run-time behaviors from resource usage perspective, without getting into an explosion of details.



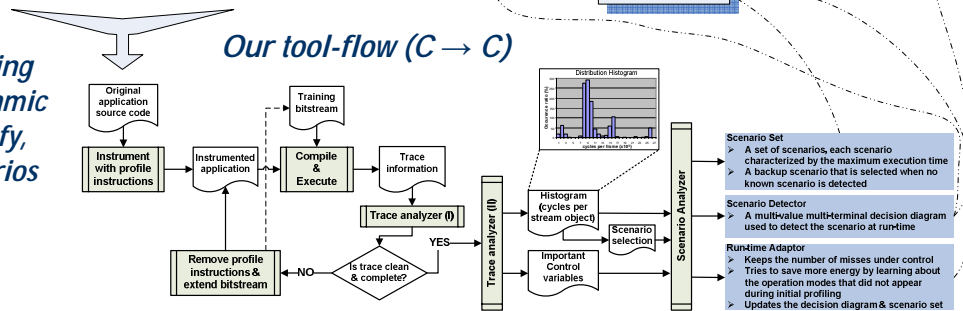
- 1. Identification:** given the application, how is it classified into scenarios?
- 2. Detection:** given a particular run-time situation, to which scenario does it belong?
- 3. Exploitation:** given a particular scenario, what can be done to optimize the system cost?
- 4. Switching:** when and how does the application switch from one scenario to another?

Energy Reduction for Streaming Oriented Applications [2]



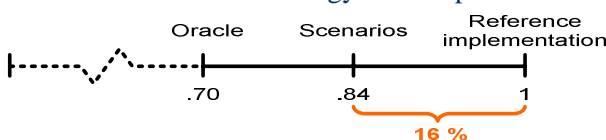
Problem: Given a soft-real time streaming application that has to execute on a dynamic voltage scaling aware processor. Identify, detect and exploit the application scenarios to reduce the energy consumption.

Our tool-flow (C → C)



Case Study:

- MP3 Decoder on an XSCALE PXA255 Processor
- Voltage switching: $E_s = 70\mu J$, $T_s = 8\mu s$
- Normalized results for energy consumption:



References

- [1] Application Scenarios in Streaming-Oriented Embedded System Design, S.V. Gheorghita et al., Proc. of the Int. Symposium in System-on-Chip (SoC), pp. 175-178, 2006.
- [2] Profiling Driven Scenario Detection and Prediction for Multimedia Applications, S.V. Gheorghita et al., Proc. of the Int. Conf. on Embedded Computer Systems: Architectures, Modeling, and Simulation (IC-SAMOS), pp. 63-70, 2006.