Open Benchmark for Java Card Technology

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Motivations

• There is no benchmark to day in smart card industry,

• What means “no” :
  • It is not public,
  • It is not accepted,
  • It is not opened.

• Benchmarks exist in :
  • R&D department of smart card manufacturer,
  • Some smart cards users organization.
Benchmark in others areas

- CPU
  - SPEC CPU2004 (http://www.spec.org/)
- Data base
  - The Open Source Database Benchmark (http://osdb.sourceforge.net/)
Benchmark in others area (cont’d)

• Transaction Processing
  – http://www.tpc.org/,
  – Top Ten TPC-C Results by Performance or Top Ten TPC-C Results by Price/Performance.

• Evolution from transactional to web services ...
What we may learn from IT

• Maturity of technology,
• Interoperable systems,
• Complexity of systems,

• =>> Require elements of measure.

• We will not replace the technology choice by a simple ranking.
What is necessary to benchmark

• In Java Card Technology:
  • Performance,
  • Compatibility in term of interoperability.
  •

• Our goals and project is to provide open benchmark on these points.
Our approach in the project

- Inventory of measurable performances,
- Applet reference design and development,
- Performance evaluation in term of time, memory consumption and power,
- Comparison with existing in house benchmark,
- Benchmark tools packaging as an open software,
- Publishing on the web.
Our approach in the project

- Inventory of measurable performances,
- Applet reference design and development,
- Performance evaluation in terms of time, memory consumption and power (in progress 1st step of card collection),
- Comparison with existing in house benchmark:
  - Volunteers?
- Benchmark tools packaging as an open software,
- Publishing on the web.
Not an easy task

• Hardware configuration:
  – EEPROM/FLASH/FeRAM.

• OS, memory model and VM implementation.

• Garbage collector.

• But this is the challenge.
Others points

• We collect Java Card from different source:
  – 1st step with small number of card,
  – 2d step with large number of card from large manufacturer but also now with Java Technology provider.
What we will not perform...

- Java Card Technology specification conformance testing,
- Security evaluation,
- Measure and publication on product results.
Smart Card Cnam Benchmark

SCCB
SCDevice
SCSystem
PhysicalCharacteristics
TechnicalCharacteristics
Java Card
GlobalPlatform

JC211
Test_Instruction
Test_JCRE2
11
Test_JCAPI2
11
Test_JCVM2
11
OP201
OP211

File: E:\work\in Progress\Memoire\SCCB_diagram.mdl
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Class Diagram: Logical View / Main Page 1
SCCB

- SCDevice checks hardware function like: memories, stack size and physical features,

- SCSystem evaluates performance of JC and OP:
  - Each packages performances are measured,
  - Others instructions (for, while,...) are also implemented.
Evaluation context

• Based on Windows platform and XP:
• Windows XP used with action:
  – To reduce and avoid constraints due to the Windows OS latency, PCs are not connected (autonomous),
• Variance on commands (command are repeated and an average calculated),
• Different PC platforms and readers will be used.
SCCB references : proposal

* $\Sigma (\alpha\cdot \text{metrics}) / \text{nbcards} = 100$

* A card will be ranked after a complete test of Applet/Metrics compare to base 100.
ShareableMetric

- LookUpAIDMetric
- GetShareableMetric
- RunSIO_functionMetric

Legend:
- SC-CNAM-2043A
- SC-CNAM-2046A
- SC-CNAM62046A
Benchmark value added

- Generation differentiation,
- Plan improvement on new implementation,
- Provide a user point of view.
Benchmark value added

• Product performances comparison and evaluation,
• May help on QoS,
• May help on consumption with a better understanding of performance (local and global),
• Open question is how “security may be measured and ranked”.
Conclusion

• Open Benchmark (SCCB) for Java Technology is launched,

• We will collect a new collection of card:
  – From volunteers,
  – and from direct purchasing.

• We will present more results directly to card providers or users organization and complete SCCB in e-smart 2005.
Thank you.