XtratuM: A Space Qualified Hypervisor for LEON-based Computers
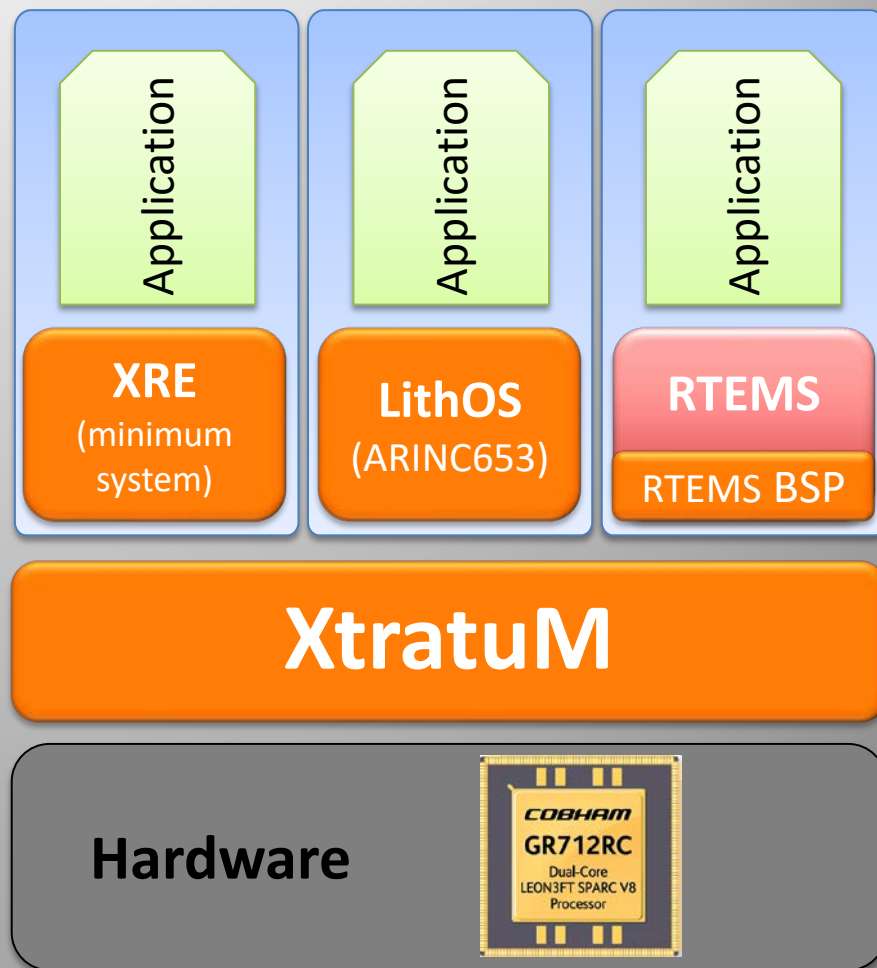
Paco Gómez-Molinero

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The XtratuM Hypervisor

- Bare metal efficient hypervisor for safety critical **time and space partitioned systems**

- It supports SPARC/LEON architectures (**LEON2, 3, 4**) and ARM architectures (**Cortex-R4/R5, A9**)

- It provides **guest run-time systems** developed by FENTISS and other third parties

- Space qualified (**ECSS level B**) for LEON3 (monocore) at ESA Project **IMA-SKQC**

Application

Application

Application

XRE
(minimum system)

LithOS
(ARINC653)

RTEMS

RTEMS BSP

XtratuM

Hardware

COBHAM
GR712RC
Dual-Core
LEON3FT SPARC V8
Processor

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XtratuM Qualification over LEON3

- IMA-Separation Kernel Qualification Campaign **(IMA-SKQC)**: ESA Project running for the last three years

- Consortium led by **Teletel** with **fentISS**, **Airbus**, and **Thales Alenia** as subcontractors

- Objective: to qualify (**ECSS level B**) XtratuM over **LEON3** (monocore): **XM-Q**

- **Qualification Data Pack** available (AR in December 2019)

XtratuM over LEON Processors Space Heritage

PLATiNO
(OBC)
XtratuM with **RTEMS**
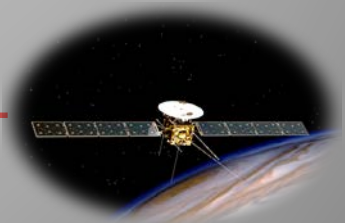**(GR740)**

Launching Dates

2020   2021   2022   2023   2024
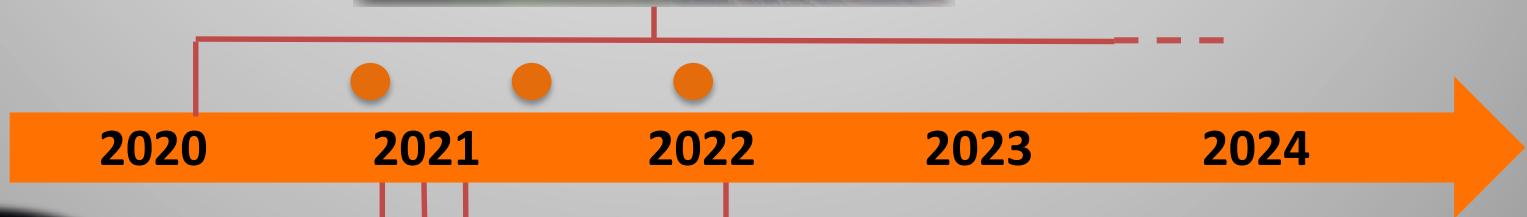
MERLIN
XtratuM
with **RTEMS**
(GR712)

JUICE
(MAJIS)
XtratuM with **LithOS**
(GR740)

SVOM
(MXT & ECLAIRS)
XtratuM with **LithOS**
(GR712 mono and dualcore)

SWOT
XtratuM with **RTEMS**
(GR712)

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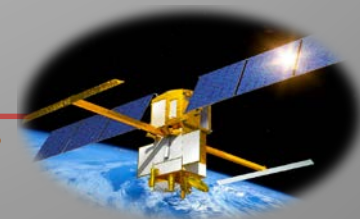
XM-Q Roadmap

- XM-Q (monocore qualified version) currently extended to support **GR712** dual core (prototype already available): **XMQ-SMP**

- Analysis and **Validation** activities on **XMQ-SMP** underway (CNES Project): available by February 2020

- Integration of **LEON4 (GR740)** support in **XMQ-SMP** during Q1-2020 (based on current non-qualified XtratuM supporting LEON4)

- Full **delta qualification** of multicore XtratuM in LEON4 planned for 2020 (pending on funding resources)

Conclusions

- Time/Space Partitioned Architectures **(TSP)** are finding their way in Platforms computers and in (complex) Payload computers

- XtratuM **already selected** in several missions in LEON-based platform computers or payloads

- XtratuM **space qualification** expected to increase confidence to select it for new missions

- Support of all **LEON processors** with the same hypervisor facilitates **reuse** of existing software in new projects

- Space Full **Delta Qualification** for **GR740** expected to be tackled in 2020

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Thanks!

Questions?

pgomez@fentiss.com

www.fentiss.com
FENT INNOVATIVE SOFTWARE SOLUTIONS, S.L.
Ciudad Politécnica de la Innovación, Edificio 9B Despacho 3
Camino de Vera s/n, 46022 Valencia, Spain
+34 963 294 704
info@fentiss.com
Twitter: @fentissXM
Linkedin: https://www.linkedin.com/company/fentiss/