俄罗斯国产处理器的前世今生

PLCT实验室

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顾钰

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苏联时期

俄罗斯时期

- 授权架构
- 自主架构

授权架构

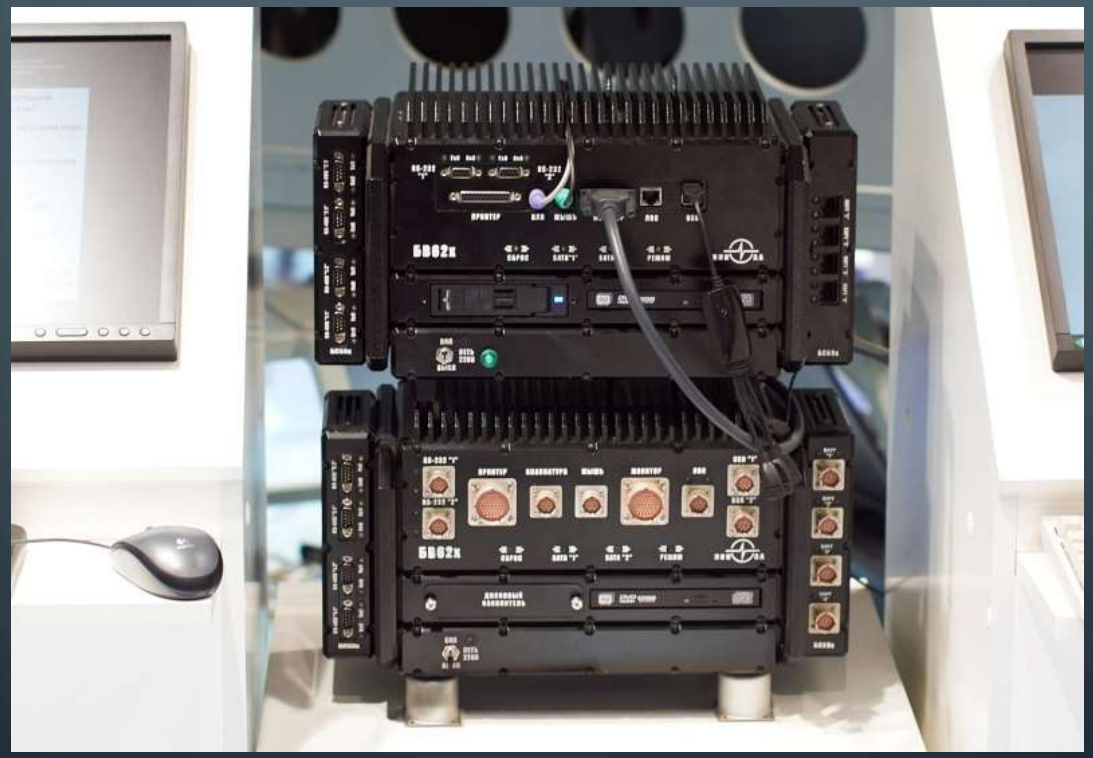
- SPARC
  - MCST R
- MIPS
  - NIISI RAS(НИИСИ РАН)
  - Baikal-T
- ARM
  - Baikal-M/S
- RISC-V
  - Syntacore
  - Cloudbear

SPARC

MCST R

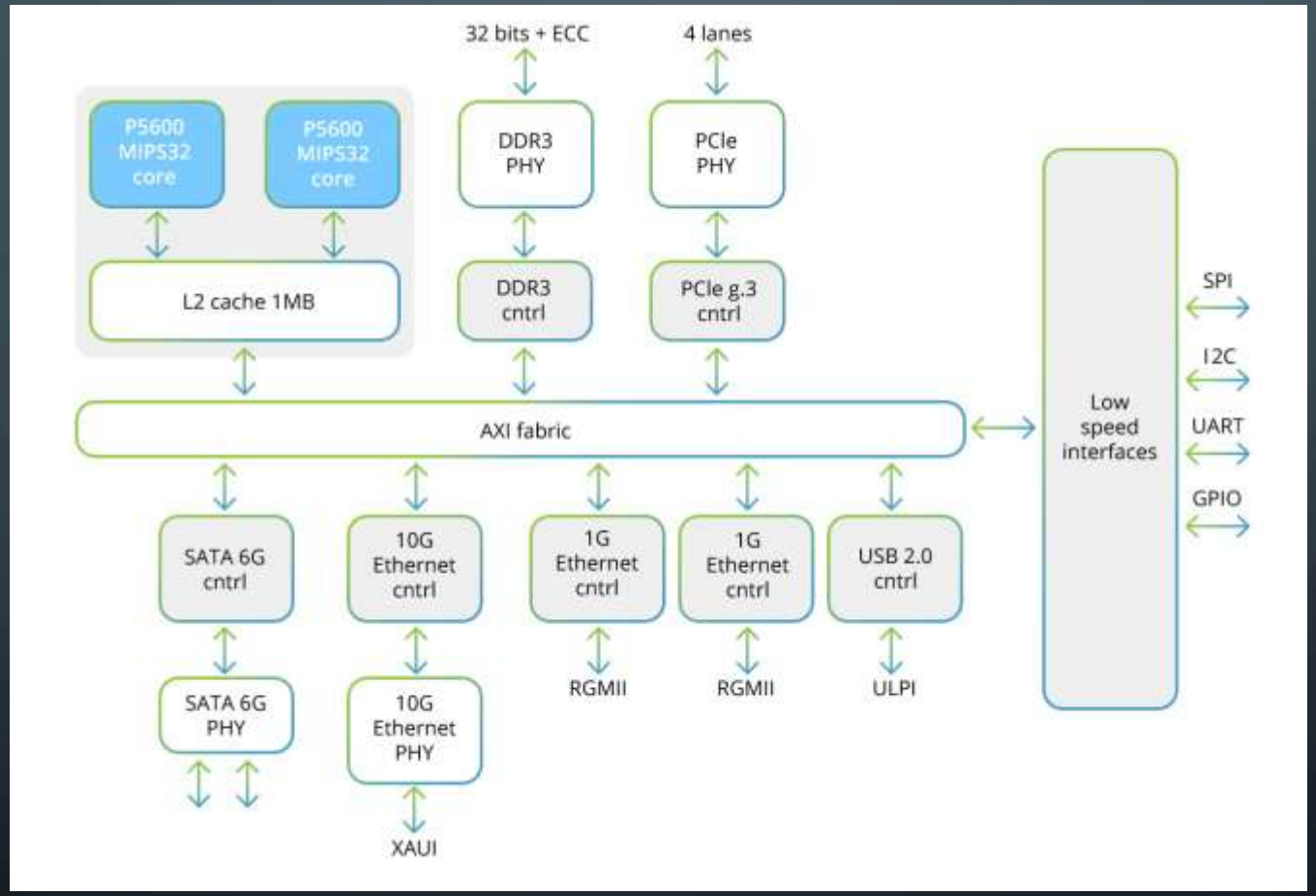
MIPS

NIISI RAS(НИИСИ РАН)



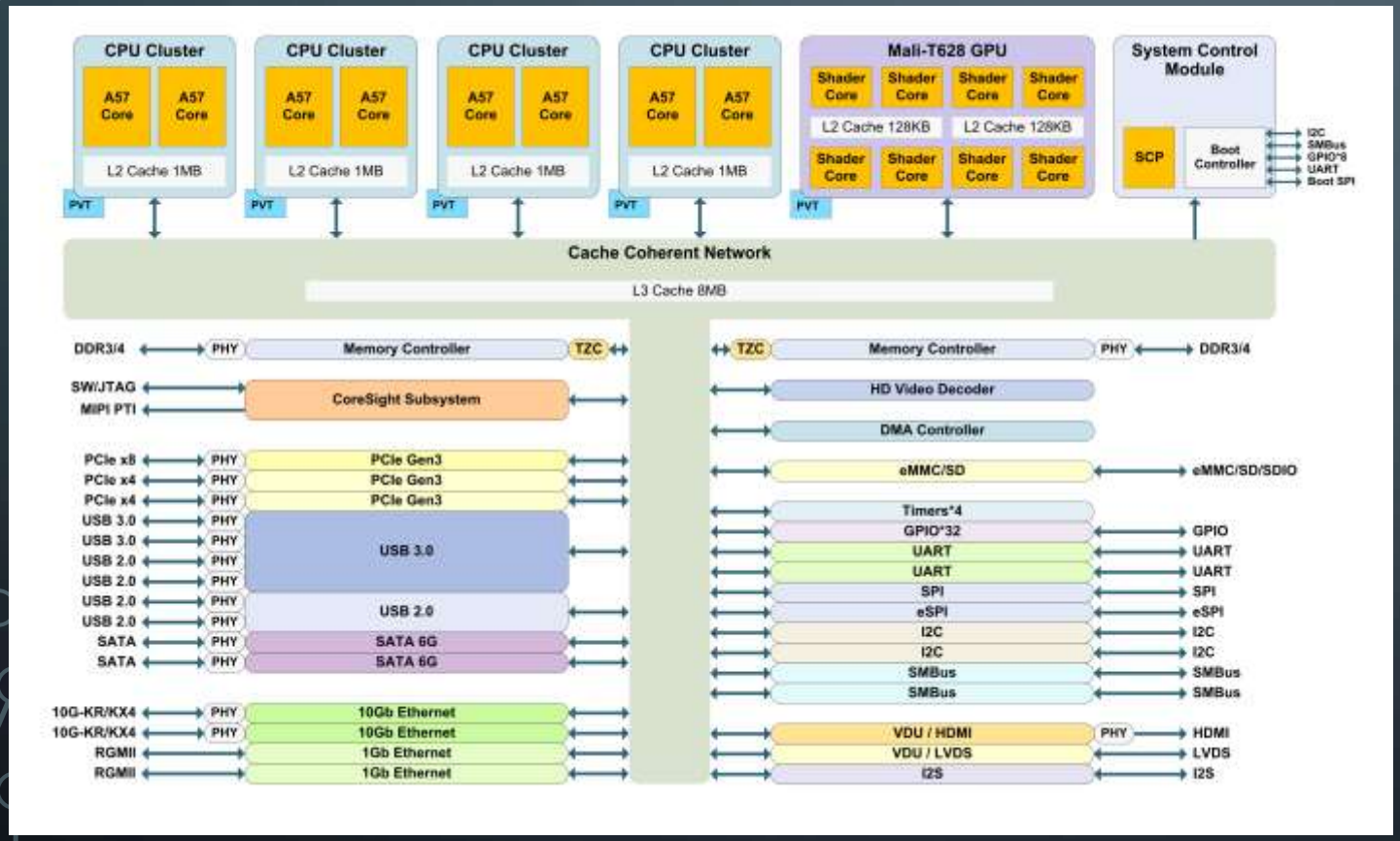
配备 CPU KOMDIV-64 的军用计算机“Voskhod”

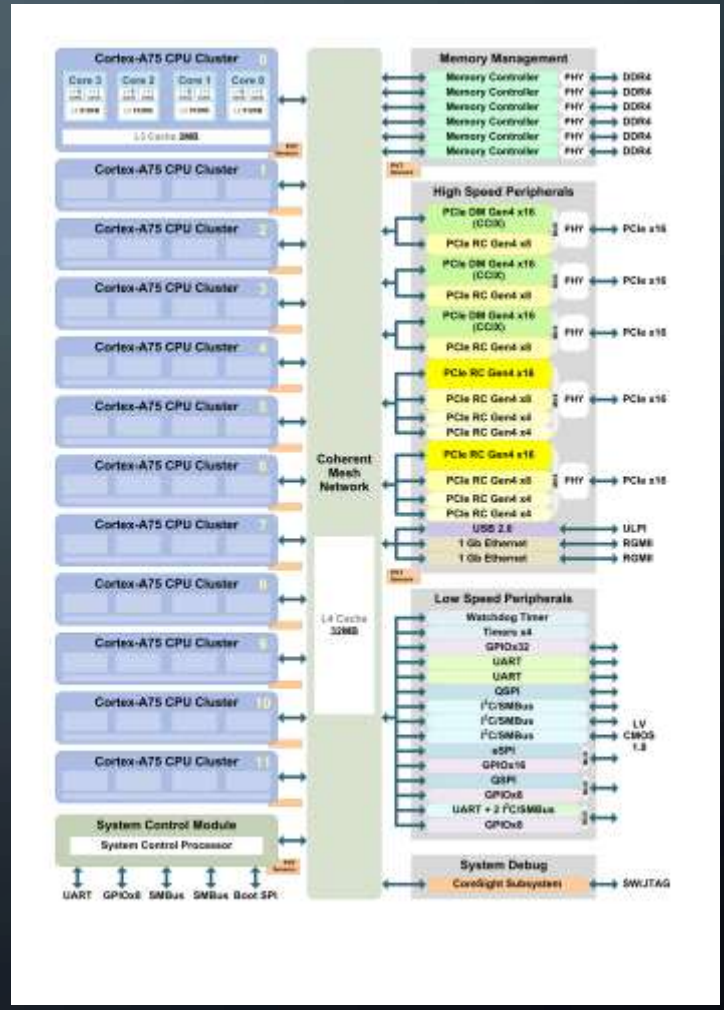
BAIKAL-T


32 bits + ECC
4 lanes
P5600 MIPS32 core
P5600 MIPS32 core
DDR3 PHY
PCIe PHY
L2 cache 1MB
DDR3 cntrl
PCIe g.3 cntrl
AXI fabric
Low speed interfaces
SPI
I2C
UART
GPIO
SATA 6G cntrl
10G Ethernet cntrl
1G Ethernet cntrl
1G Ethernet cntrl
USB 2.0 cntrl
SATA 6G PHY
10G Ethernet PHY
RGMII
RGMII
ULPI
XAUI

ARM

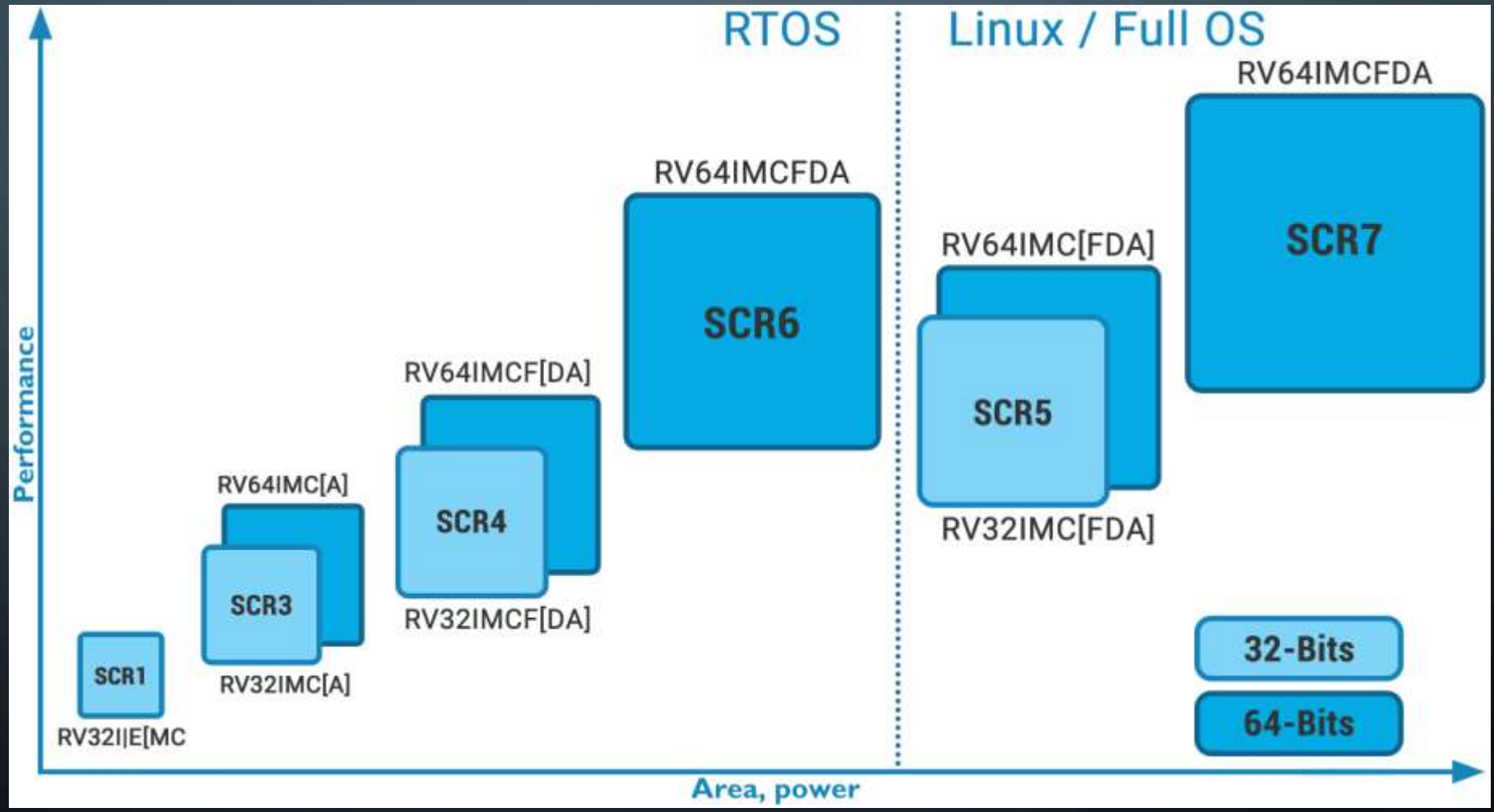
BAIKAL-M/S


CPU Cluster
A57 Core
A57 Core
L2 Cache 1MB
PVT
Mali-T628 GPU
Shader Core
L2 Cache 128KB
System Control Module
SCP
Boot Controller
I2C
SMBus
GPIO*8
UART
Boot SPI
Cache Coherent Network
L3 Cache 8MB
DDR3/4
PHY
Memory Controller
TZC
SWJTAG
MIPI PTI
CoreSight Subsystem
HD Video Decoder
DMA Controller
PCIe x8
PCIe x4
PCIe Gen3
USB 3.0
USB 2.0
SATA
SATA 6G
eMMC/SD
eMMC/SD/SDIO
Timers*4
GPIO*32
GPIO
UART
SPI
eSPI
I2C
SMBus
10G-KR/KX4
10Gb Ethernet
RGMII
1Gb Ethernet
VDU / HDMI
HDMI
VDU / LVDS
LVDS
I2S


Cortex-A75 CPU Cluster
Coherent Mesh Network
L4 Cache 32MB
Memory Management
High Speed Peripherals
Low Speed Peripherals
System Control Module
System Control Processor
System Debug
CoreSight Subsystem
SWJTAG
UART
GPIOx8
SMBus
Boot SPI

RISC-V

SYNTACORE

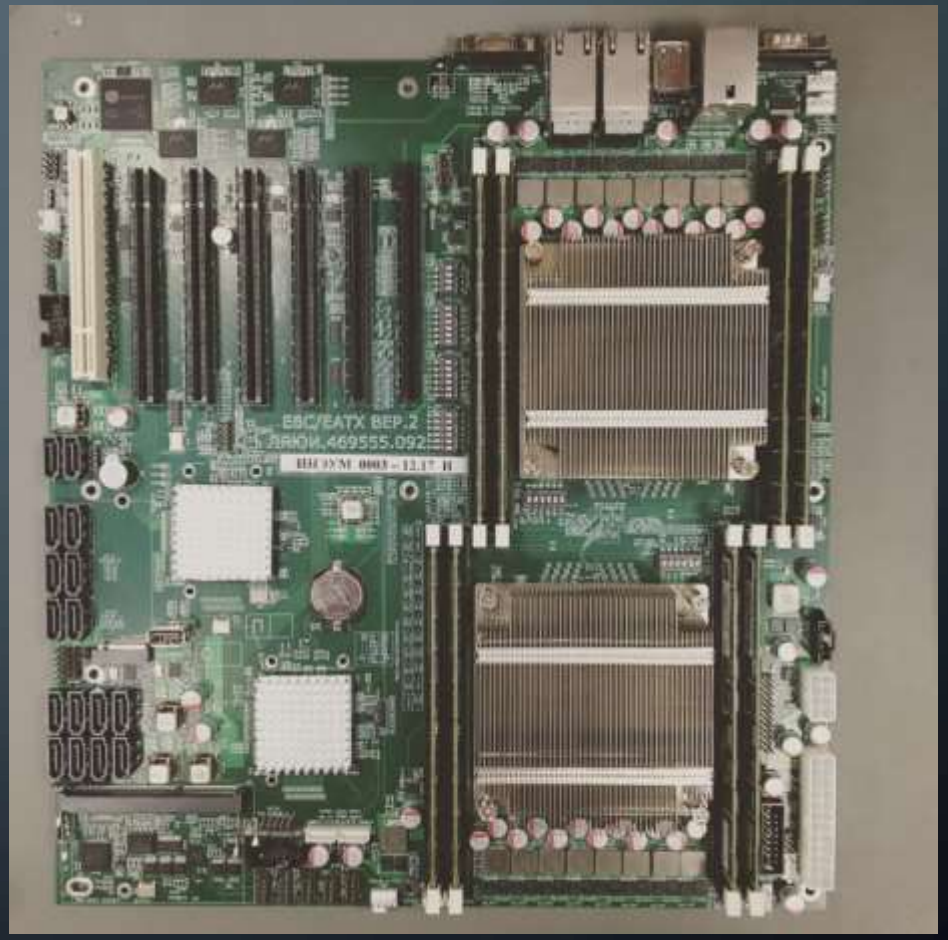

RTOS
Linux / Full OS
Performance
Area, power
RV64IMCFDA
SCR6
RV64IMCF[DA]
SCR4
RV32IMCF[DA]
RV64IMC[A]
SCR3
RV32IMC[A]
SCR1
RV32I|E[MC
RV64IMC[FDA]
SCR5
RV32IMC[FDA]
RV64IMCFDA
SCR7
32-Bits
64-Bits

自主架构

- Elbrus (Эльбрус)
- MALT
- Leonhard

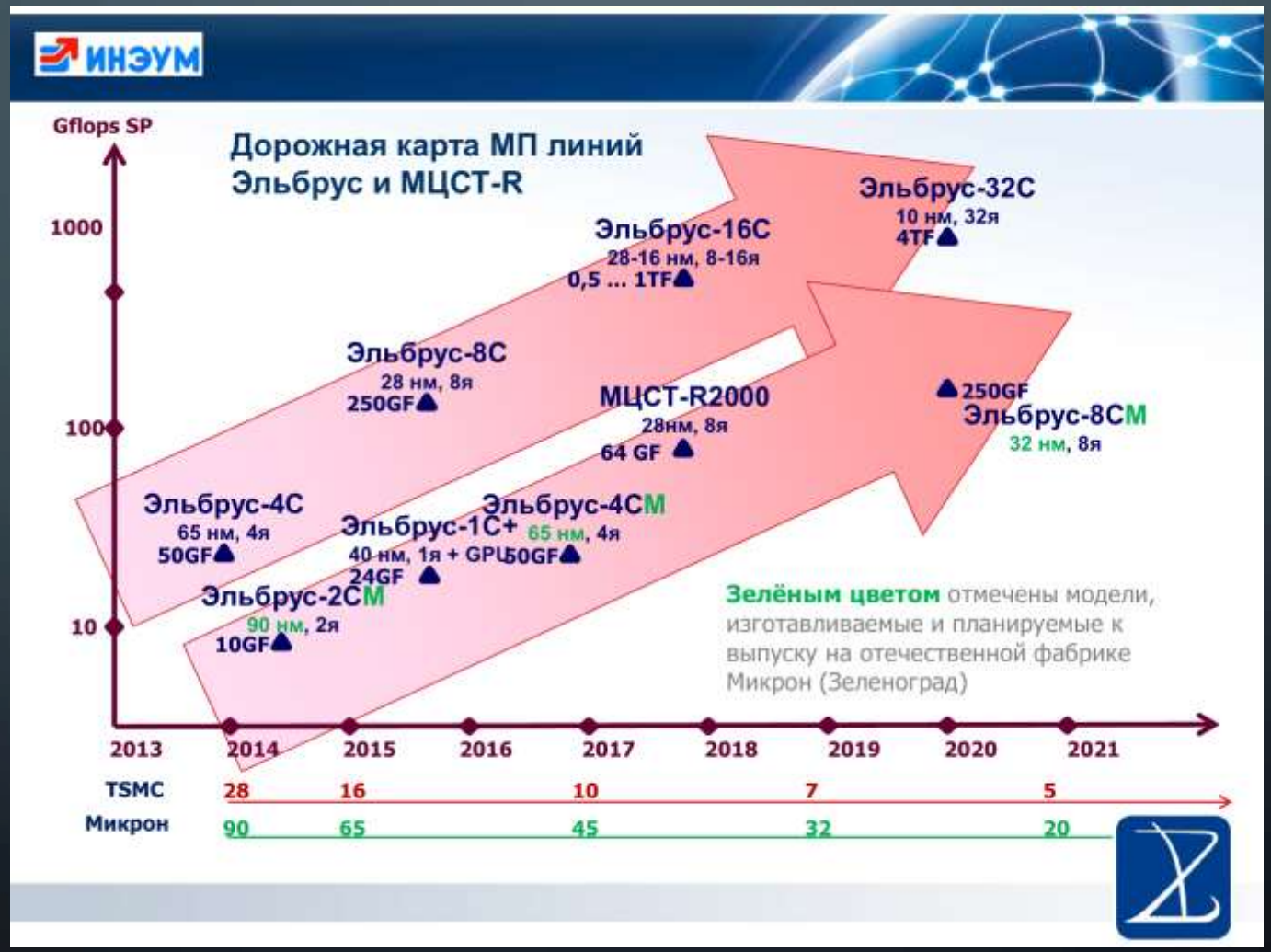
ELBRUS(ЭЛЬБРУС)

- ELBRUS (ExpLicit Basic Resources Utilization Scheduling)
- VLIW (Very Long Instruction Word)



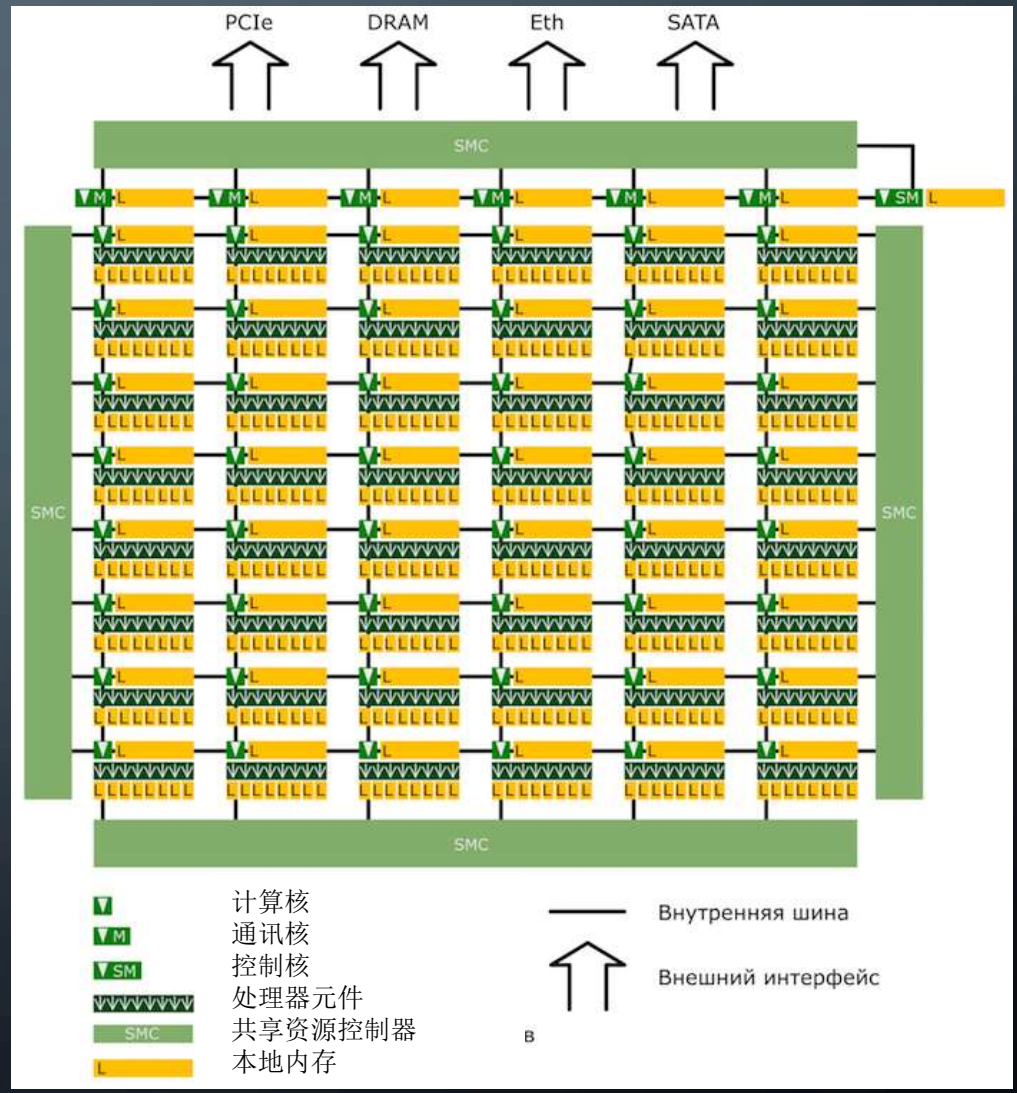
基于 Elbrus-8S 的主板

ELBRUS (ЭЛЬБРУС)



MALT(Manycore Architecture With Lightweight Threads)

MALT-Cv1



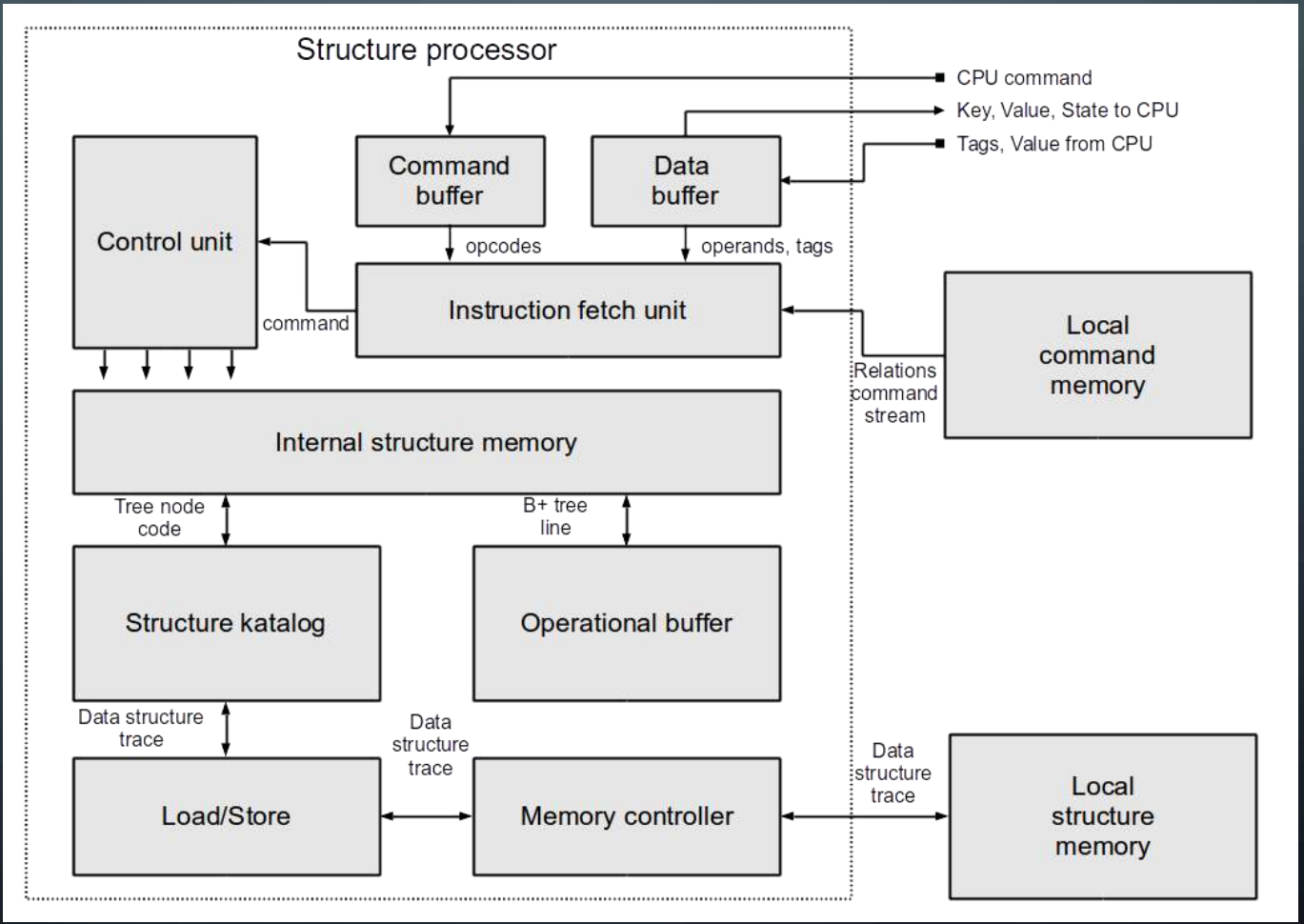
MALT(Manycore Architecture With Lightweight Threads)

MALT-C	MALT-D	MALT-F
- 基于以太坊的智能合约处理 - 创建可信区块链解决方案 - 流加密、信息完整性验证 - 现代加密货币的挖掘	- 使用大型图形结构 - 使用 B 树进行大规模并行工作 - 社交网络的深入分析 - 加速 SQL 和 NoSQL 数据库中的操作	- 气体动力学问题的元胞自动机 - 自适应网格的数值计算 - 粒子物理的蒙特卡罗方法 - 不规则稀疏矩阵的运算

LEONHARD

- DISC指令集（Discrete Mathematics Instruction Set computer）
- 在低时钟速度 (267 MHz) 下，Leonhard 的性能超过了 Intel Xeon 系列微处理器。
- Leonhard 微处理器占用的芯片资源比 Intel Core 系列的一个内核少 400 倍。
- Leonhard 微处理器的能耗比 Intel Core 系列的一个内核低 15 倍。
- 计算史上首次开发出通用多指令流单数据流（MISD）计算系统。

LEONHARD


Structure processor
CPU command
Key, Value, State to CPU
Tags, Value from CPU
Command buffer
Data buffer
Control unit
opcodes
operands, tags
command
Instruction fetch unit
Local command memory
Relations command stream
Internal structure memory
Tree node code
B+ tree line
Structure katalog
Operational buffer
Data structure trace
Data structure trace
Load/Store
Memory controller
Data structure trace
Local structure memory

感谢观看！