First Level-E Liquid-cooled OAI Based AI System Solution

Peter Chen

Enflame Technology
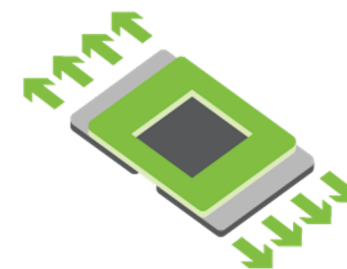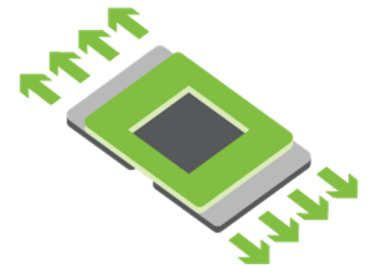
Agenda

- Enflame in OAI Community

- Enflame OAM Product Family

- Liquid-cooled OAI System

- CloudBlazer Matrix - OAI training cluster

- Software Stack: CloudBlazer Station

Enflame in OAI Community

- 3/2018 Found in Shanghai, China
- 7/2019 Enflame joined OAI group
- 12/2019 first gen OAM bringup, 7/2021 2nd gen OAM bringup
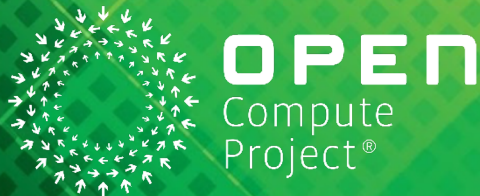
2019/07 — Join OCP

2019/08 — OAI JDA Member

2019/12 — T11

2020/10 — OCP China Day

2021/01 — OCP Tech Talk

2021/07 — T21

2021/07 — OCP China Day

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Enflame OAM Product Family

Enflame OAM Product Family

CloudBlazer T11 OAM
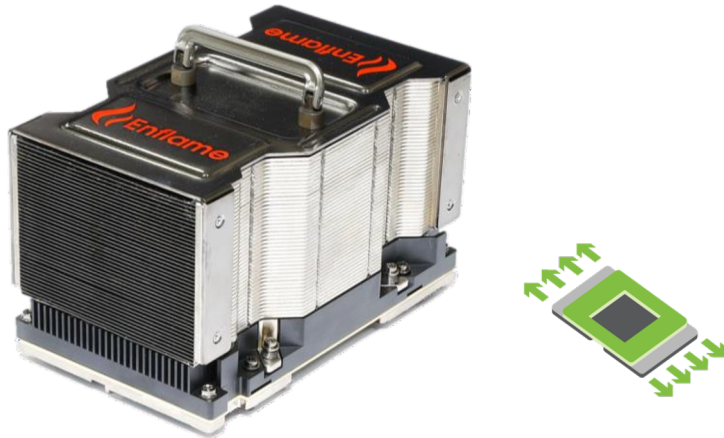
- OAM Spec v1.0 compatible , first OAM in China
- In production

CloudBlazer T11 Spec		
CHIP		DTU 1.0
Date Type		FP32
		FP16/BF16
		INT32/INT16/INT8
Performance	FP32	22 TFLOPS
	FP16	86 TFLOPS
	BF16	86 TFLOPS
HBM2	SIZE	16 GB
	BANDWIDTH	560 GB/s
Form Factor	OAM	64 GB/s
Interconnect	GCU-LARE	200 GB/s
TDP		300 watt

Enflame OAM Product Family

CloudBlazer T21 OAM
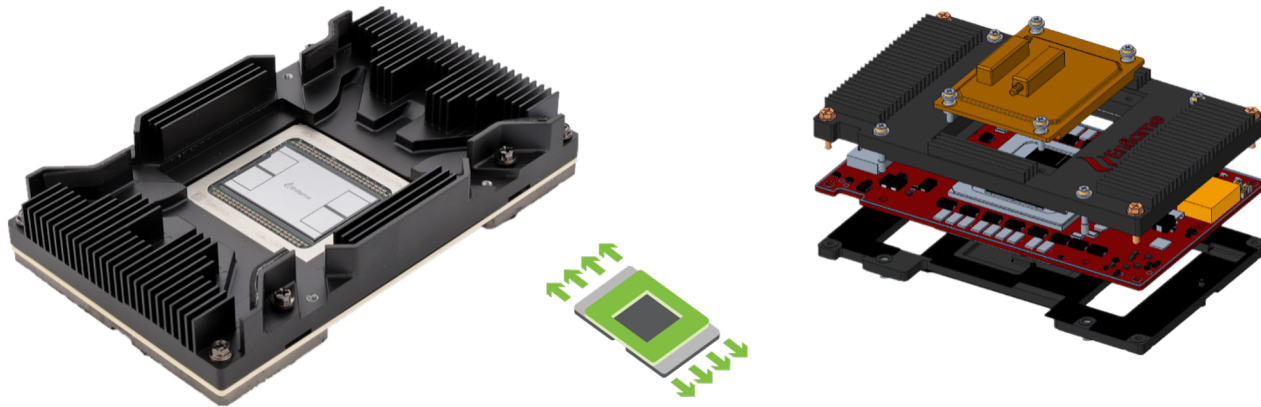
- OAM Spec v1.1 compatible
- MP in late Q2'2022

CloudBlazer T21 Spec		
CHIP		DTU 2.0
Date Type		FP32/TF32
		FP16/BF16
		INT32/INT16/INT8
Performance	FP32	32 TFLOPS
	TF32/FP16/BF16	128 TFLOPS
	INT8	256 TFLOPS
HBM2E	SIZE	32 GB
	BANDWIDTH	1.8 GB/s
Form Factor	OAM	64 GB/s
Interconnect	GCU-LARE	300 GB/s
TDP		400 watt

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Enflame OAM/UBB Physical Level Test Solution

- Measure S-parameter both for UBB and OAM
- Evaluate channel loss budget
- Check OAM SerDes Topology
- Debug SerDes link issue
- Improve UBB and OAM SerDes full link design
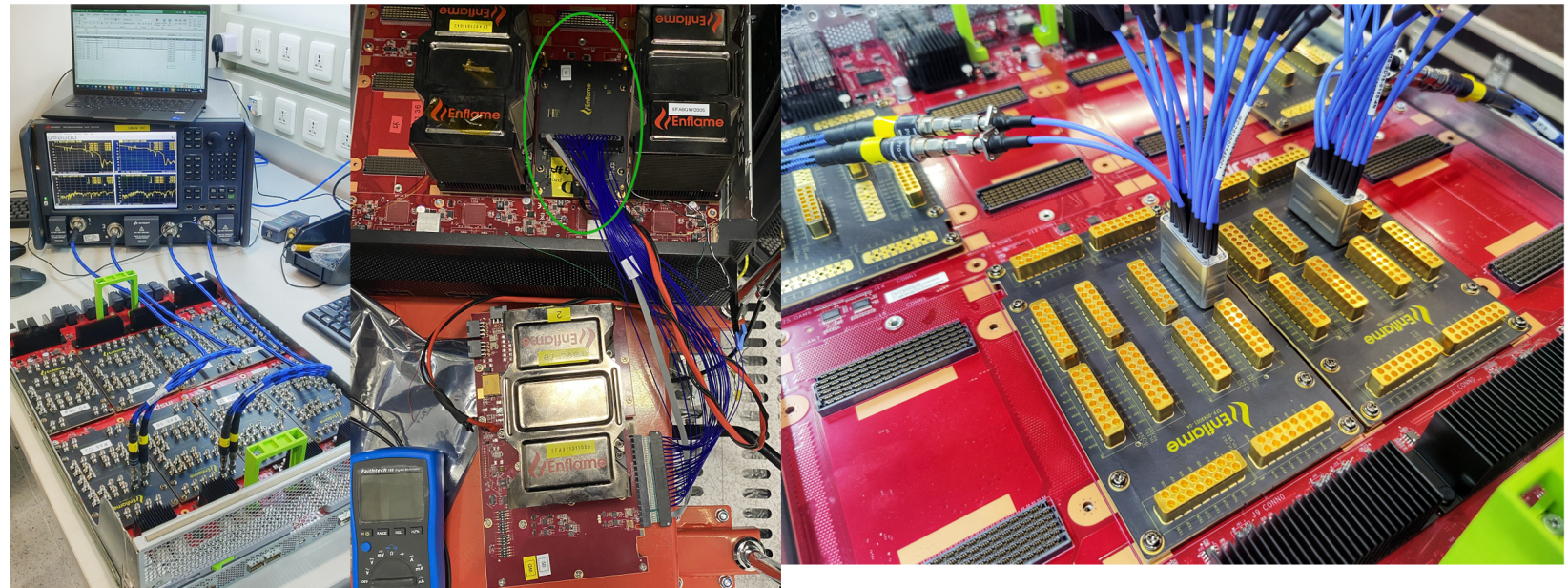
Enflame Liquid-cooled OAI System

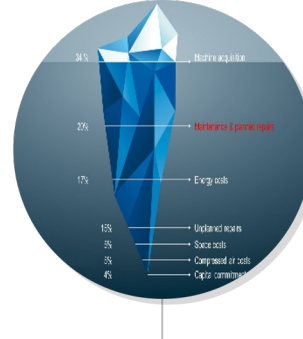Connect. Collaborate. Accelerate.

Why Liquid-cooling

Higher TDP

Higher Compute Density

T21: 400W
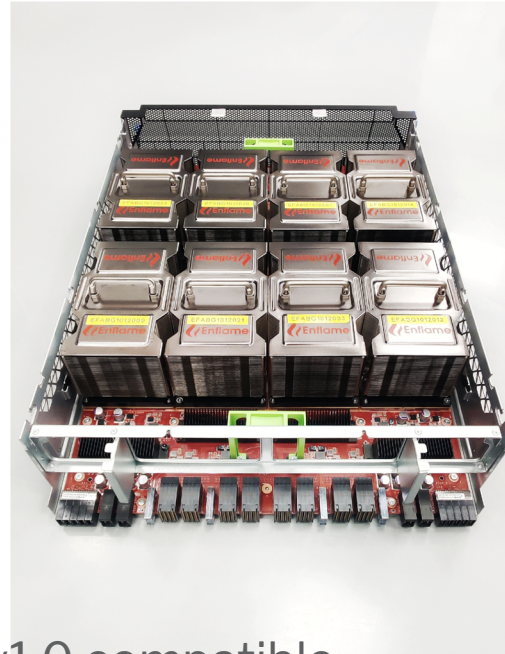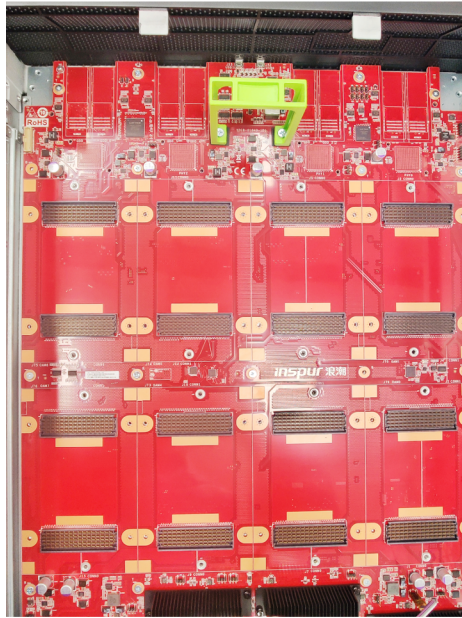
H100: 700W

Better TCO

Energy Cost

Maintenance & Planned Repairs

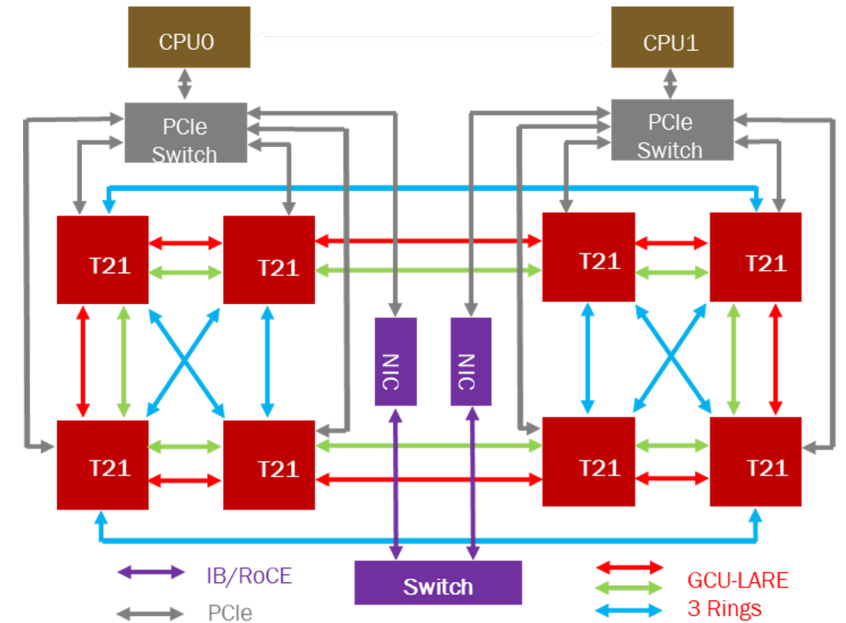Liquid Cooling: CPU/OAM working in a proper temperature, better reliability

Lower PUE

Carbon peaking and carbon neutrality goals

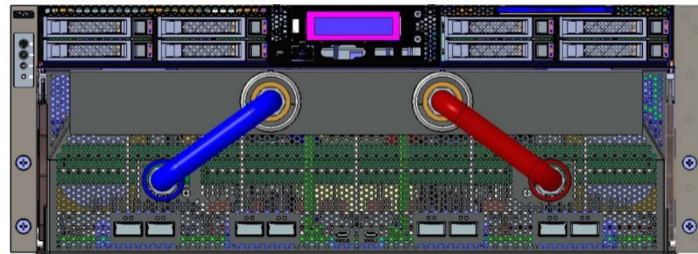National computing network to synergize east and west

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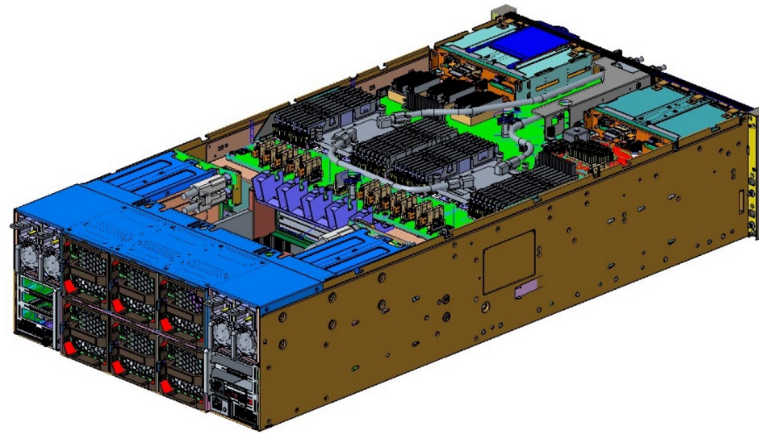
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Enflame UBB and System Topology
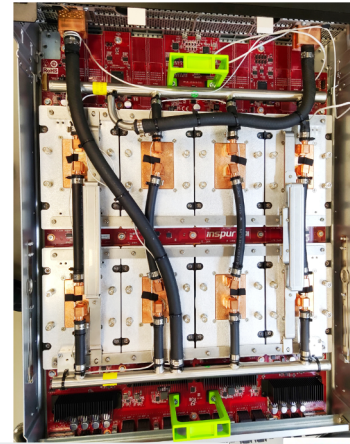

- UBB Spec v1.0 compatible

OAM T11/T21 based OAI system
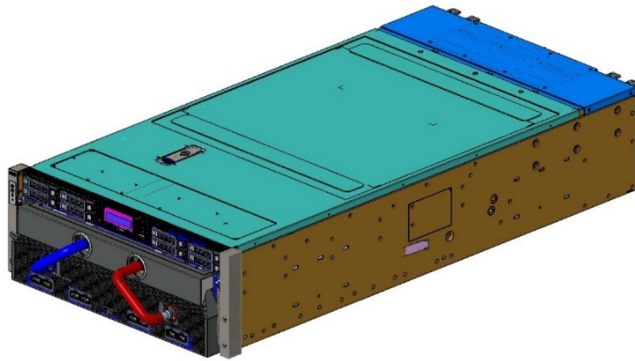
Configuration	
Dimension	4U
CPU	2 Socket
OAM	8 T11/T21(OAM spec v1.1)
UBB	UBB Spec v1.0
Thermal	Cold-Plate Liquid Cooling

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Enflame Liquid-cooled UBB tray
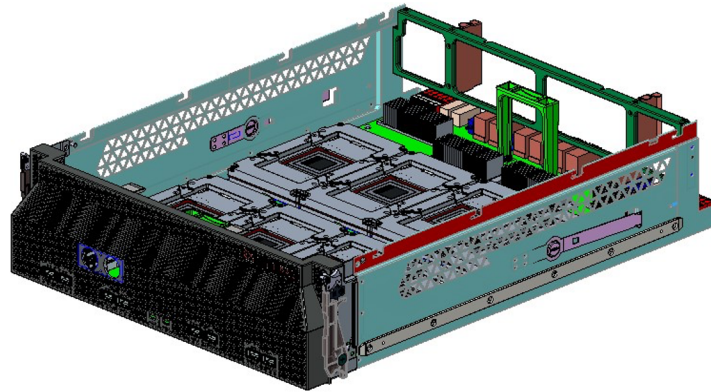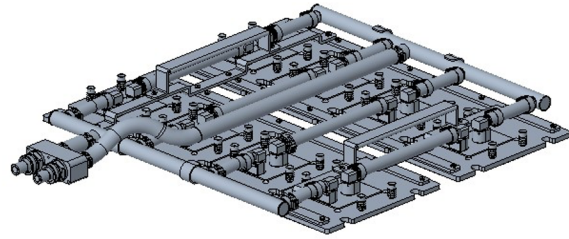
- OAM Cooling Capacity up to 3200W

CloudBlazer Matrix - **OAI training cluster**

Enflame OAI System Rack

Front View

Rear View

IB Swtich
Ethernet Switch
Management Server
Management Server
Compute Node
Compute Node
Compute Node
Compute Node
PDU
PDU
Compute Node
Compute Node
Compute Node
Compute Node

	CloudBlazer Rack
GPU	64 *T21
GPU DRAM	2TB
Perf	2.16 petaFLOPS FP32 8 petaFLOPS TF32
Interconnect	300GB/s DTU
CPU	40 * AMD EPYC 7743
Host Memory	8TB
Network	200GB/s InfiniBand 10GB/s 1GB/s
Storage	24 * 1TB M.2 NVMe 64* 3.84TB U.2 NVME
SW	Ubuntu Linux CentOS
Size	42U
Rack Power	63kW
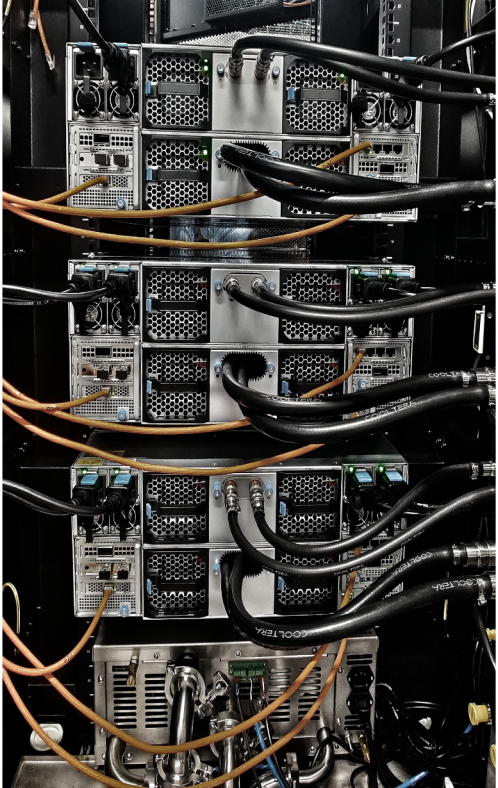
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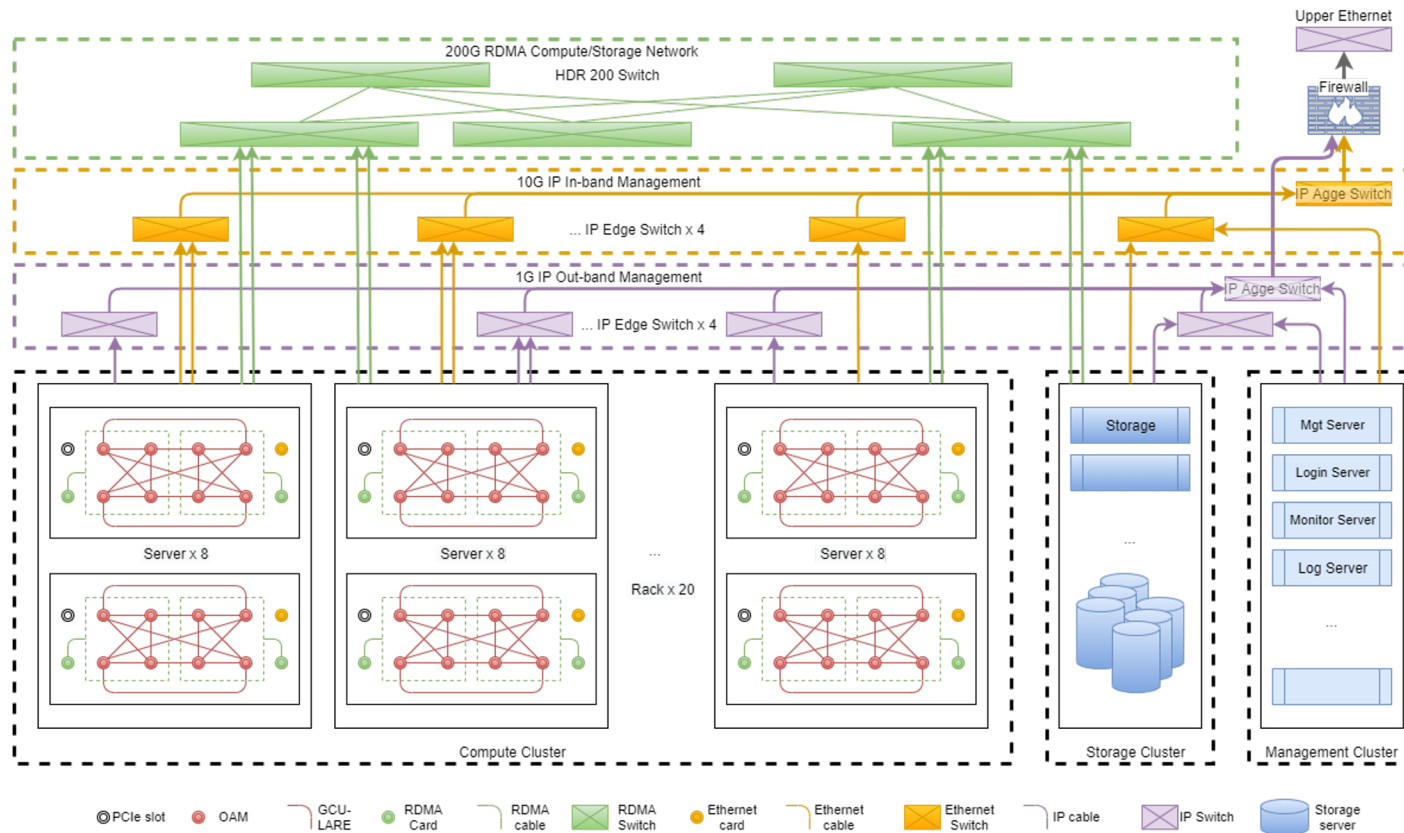# CloudBlazer Matrix - OAI Training Cluster

CloudBlazer Matrix

CDU

Condensing Tower

AC

- Up to 1280 OAM, 160 Servers, 20 Racks
- FP32: 28P, FP16:110P
- Cooling: Liquid (Cold Plate)
- Rack Power: Up to 63kW

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CloudBlazer Matrix

- Compute Cluster
- Storage Cluster
- Management Cluster
- Fat Tree Network
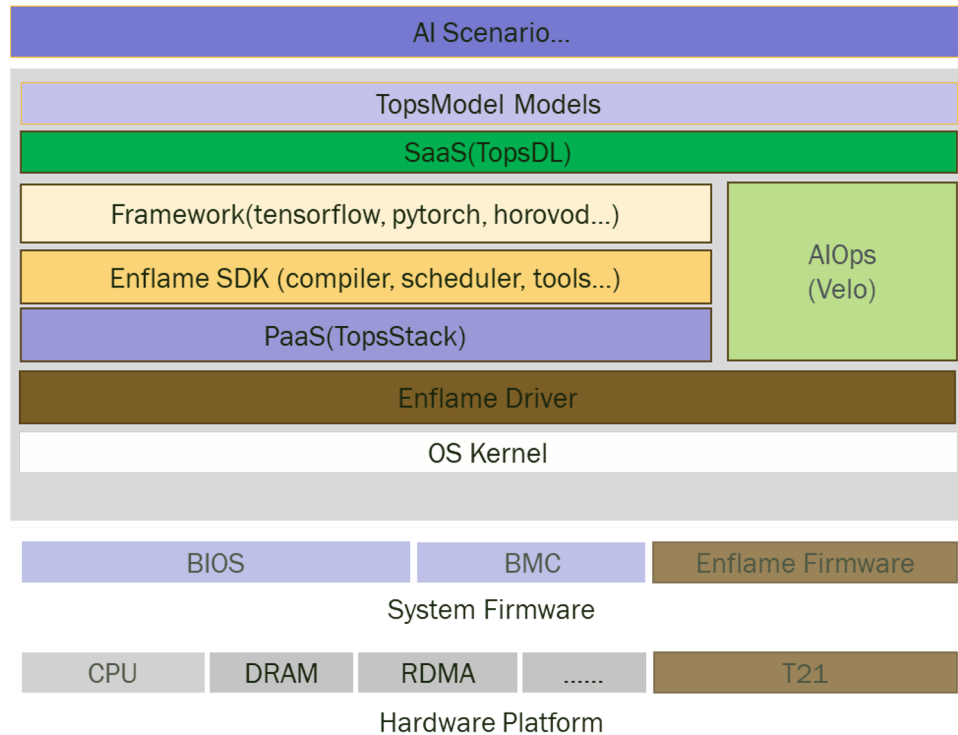- Enflame defined GCU-LARE for Scale Up
- RDMA for Scale Out

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Software Stack: CloudBlazer Station

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CloudBlazer Station

AI Scenario...		
TopsModel Models		
SaaS(TopsDL)		
Framework(tensorflow, pytorch, horovod...)		AIOps (Velo)
Enflame SDK (compiler, scheduler, tools...)		
PaaS(TopsStack)		
Enflame Driver		
OS Kernel		

BIOS	BMC	Enflame Firmware

System Firmware

CPU	DRAM	RDMA	......	T21

Hardware Platform

Thank You!

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