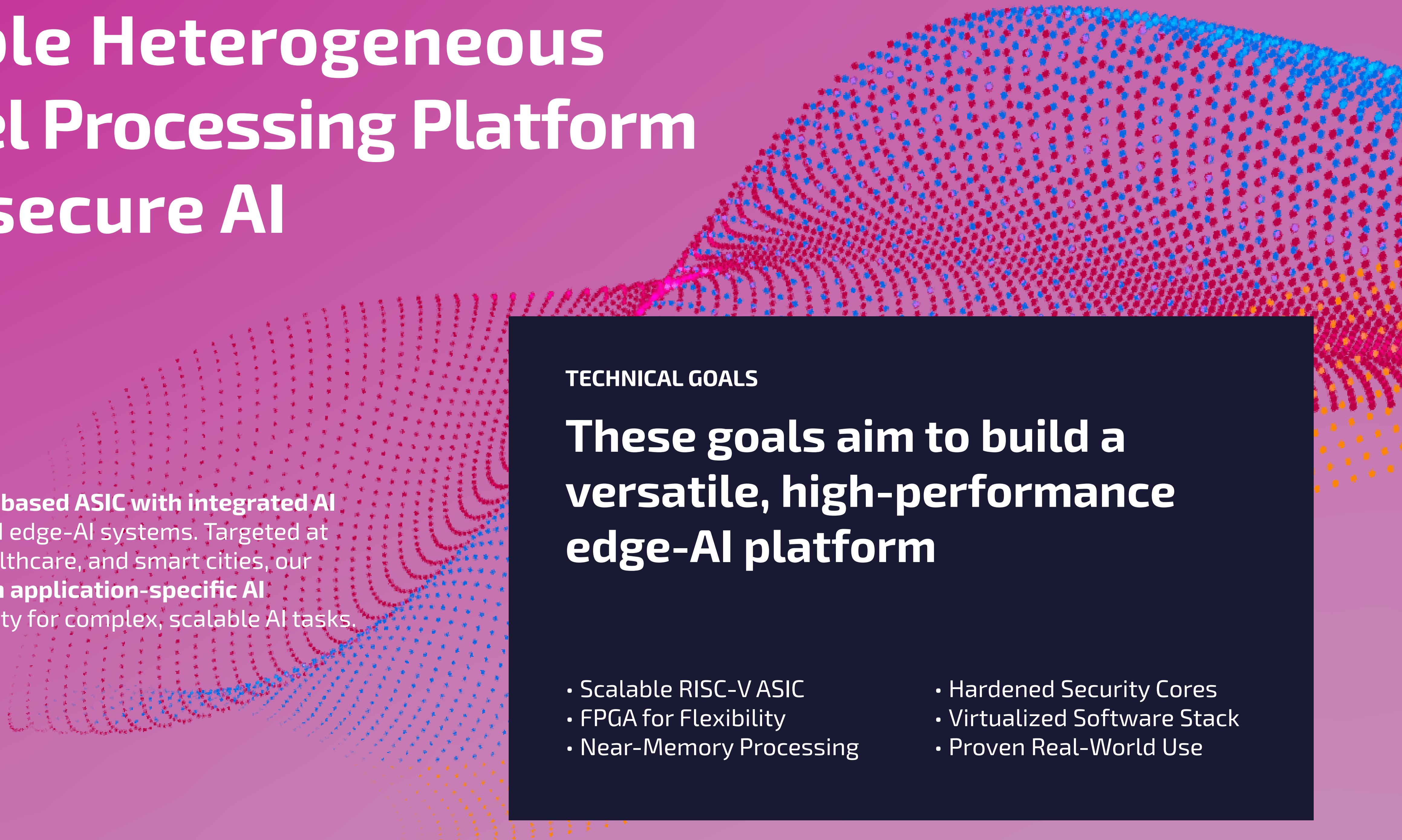




Scalable Heterogeneous AI Processing Platform for Secure AI

ASIC-based ASIC with integrated AI
edge-AI systems. Targeted at
healthcare, and smart cities, our
application-specific AI
platform provides the security
for complex, scalable AI tasks.

TECHNICAL GOALS

These goals aim to build a
versatile, high-performance
edge-AI platform

- Scalable RISC-V ASIC
- FPGA for Flexibility
- Near-Memory Processing
- Hardened Security Cores
- Virtualized Software Stack
- Proven Real-World Use

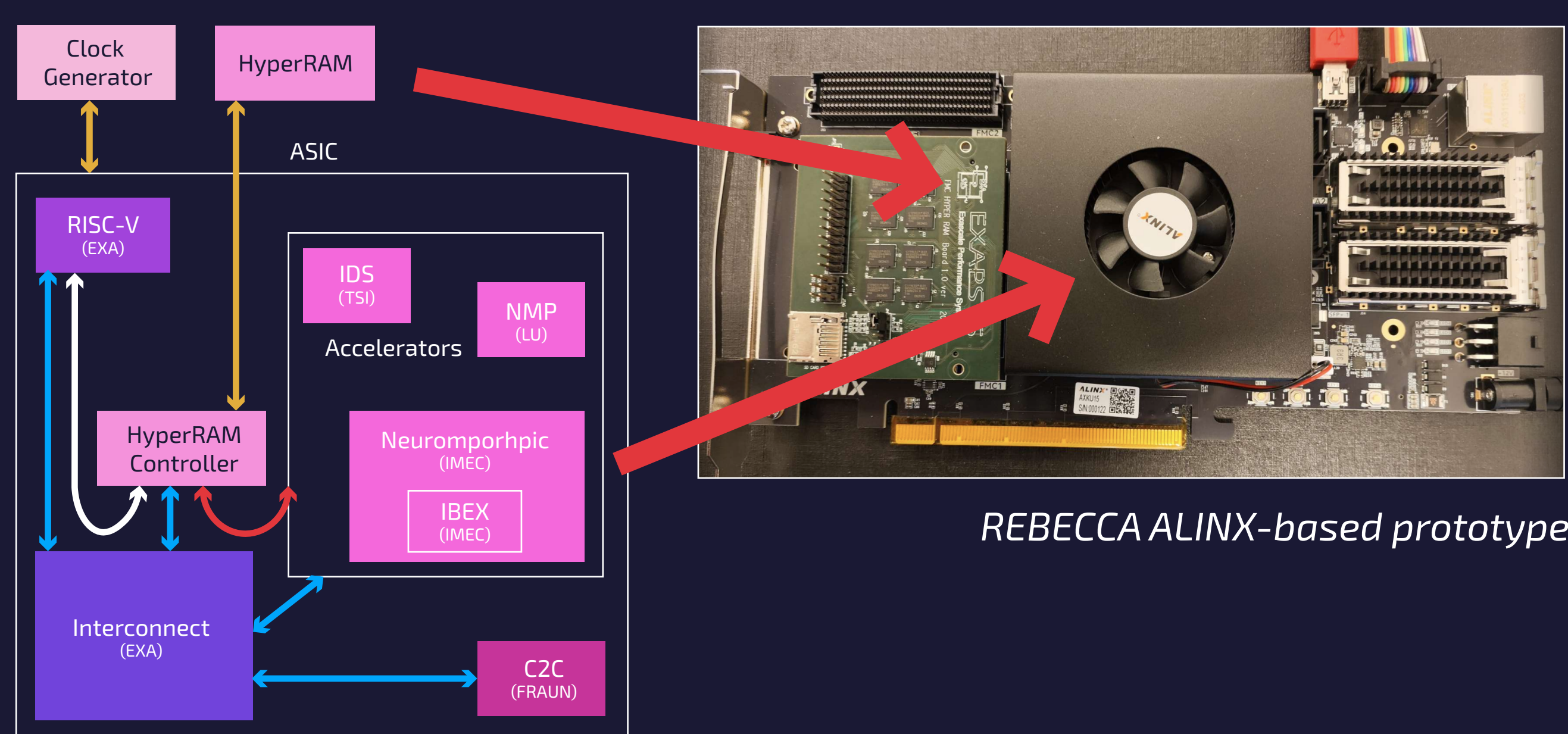
The REBECCA project develops a **RISC-V-based ASIC with integrated AI and security accelerators**, for advanced edge-AI systems. Targeted at critical applications like automotive, healthcare, and smart cities, our **ASIC connects to an external FPGA with application-specific AI accelerators** and I/O, enhancing flexibility for complex, scalable AI tasks.

These goals aim to build a versatile, high-performance edge-AI platform

- Scalable RISC-V ASIC
- FPGA for Flexibility
- Near-Memory Processing
- Hardened Security Cores
- Virtualized Software Stack
- Proven Real-World Use

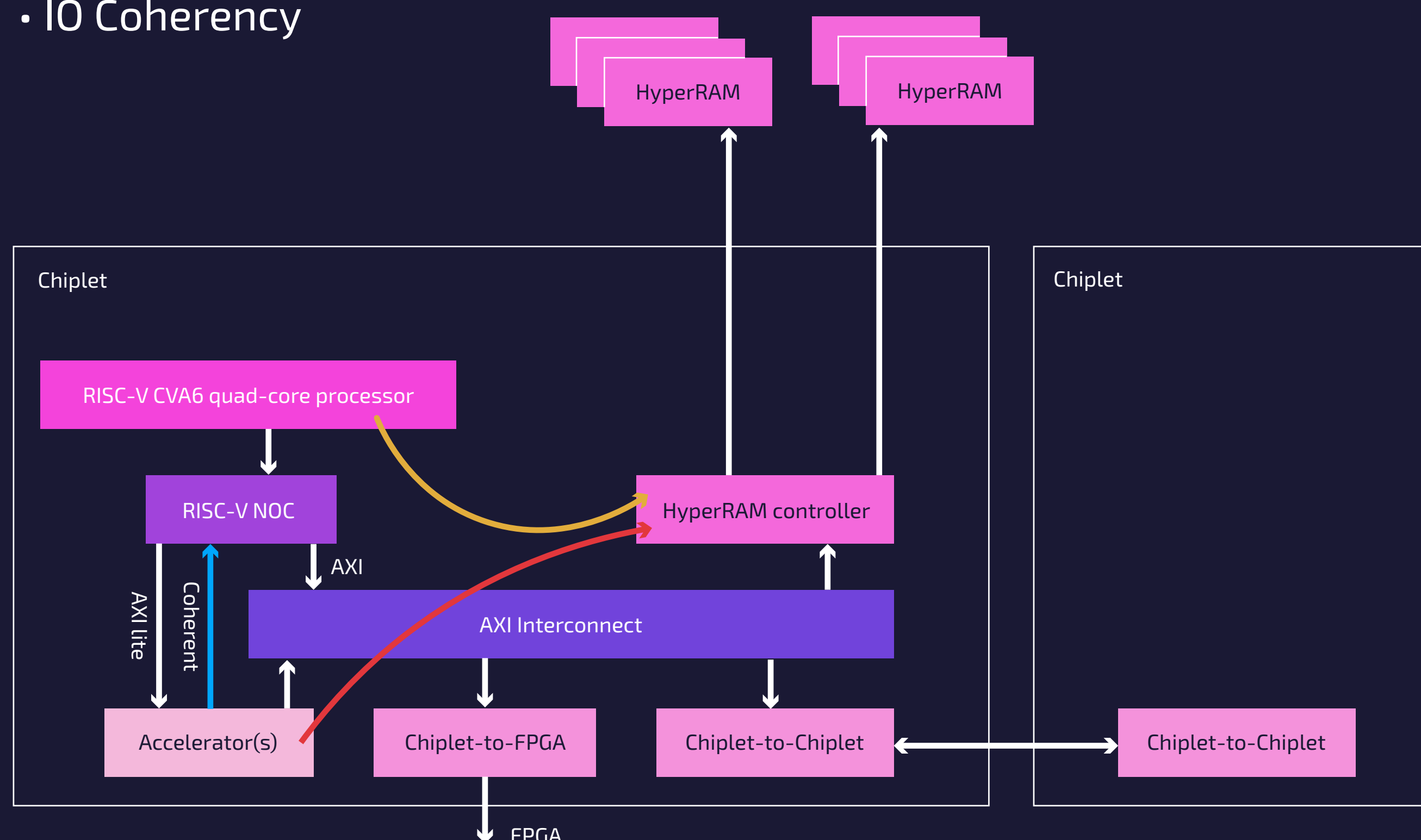
ASIC EMULATION

- A proper Linux image corresponding to the new system has been implemented
- Successfully booted Linux (first time CVA6 on ALINX) using 512MB HyperRAM as main memory
- IDS device driver (user space and uio driver)



HARDWARE GLOBAL ROUTING

- 512 MB HyperRAM
- Chiplet-to-Chiplet
- Shared memory model
- IO Coherency



```

has
ing

Mem: 61824K used, 421548K free, 28K shrd, 8K buff, 47468K cached
CPU: 5.0% usr 1.2% sys 0.0% nic 88.7% idle 0.0% io 0.0% irq
load average: 0.07/0.21/0.00 1/56/151
#PID#PPID#USER#ST#T#VSZ#RSS#CPU#VIRT#COMMAND
151 146 root R 3384 0/7 3 111.2 top
152 1 root S 7260 0/4 0 0.0 sshd: /usr/sbin/sshd [listener] 0
1 0 root S 3384 0/7 0 0.0 init
1 root S 3384 0/7 2 0.0 /sbin/sash
102 1 root S 3384 0/7 0 0.0 /sbin/syslogd -n
101 1 root S 3384 0/7 3 0.0 /sbin/lsmd -n
126 1 root S 1996 0/4 0 0.0 /usr/sbin/rpcbind
19 2 root S 0 0/0 0 0.0 /usr/sbin/rsyncd+ev
39 2 root SW 0 0/0 1 0.0 [xdtvmpfs]
39 2 root IW 0 0/0 0 [rcu_sched]
39 2 root IW 0 0/0 3 [rcu_tasks]
41 2 root IW 0 0/0 3 [worker/0:1-mm_]
43 2 root IW 0 0/0 0 [worker/1:1-mm_]
2 0 root SW 0 0/0 1 [kthreadd]
46 2 root SW 0 0/0 1 [kswapd]
45 2 root IW 0 0/0 2 [worker/0:1-mm_]
34 2 root IW 0 0/0 0 [worker/0:1-eve]
20 2 root IW 0 0/0 3 [worker/0:30-eve]
44 2 root IW 0 0/0 1 [worker/gdb2-ev]
3 2 root txc 0 0/0 0 [rcu_gp]
4 2 root txc 0 0/0 0 [rcu_par_gp]

# lspcu
Architecture: riscv64
Byte Order: Little Endian
CPU(s): 4
On-line CPU(s) list: 0-3
NUMA:
NUMA node(s): 1
NUMA node0 CPU(s): 0-3
# uname
uname uname26
# uname -a
Linux buildroot 6.1.0 #39 SMP Mon Oct 7 13:43:23 EEST 2024 riscv64 GNU/Linux
# free -h
total used free shared buff/cache available
Mem: 483372 12604 421908 28 48860 418520
Swap: 0 0 0

```

SW ON ALINX

- A proper Linux image corresponding to the new system has been implemented
- Successfully booted Linux (first time CVA6 on ALINX) using 512MB HyperRAM as main memory
- IDS device driver (user space and uio driver)

```

CPU: 618x400, vmlinux-4.22.0-rc8, 20k nix, 80k half, 47680k cache
CPU: 5.0s user 6.2s sys 0.0s nix 88.7% idle 0.0% to 0.0% i/o 0.9% irq
CPU: 0.0% user 1.07% sys 0.0% nix 92.9% idle 0.0% to 0.0% i/o 0.9% irq

151 146 root R 3384 0.7 3 11.1 %t
152 146 root R 3384 0.7 3 11.1 %t
153 146 root S 3384 0.7 1 0.0 unit
154 146 root S 3384 0.7 1 0.0 unit
102 146 root S 3384 0.7 1 0.0 /sbin/symlink -n
103 146 root S 3384 0.7 1 0.0 /sbin/symlink -n
104 146 root S 3384 0.7 1 0.0 /sbin/symlink -n
126 146 root S 1996 0.4 0 0.0 /usr/sbin/rpcbind
9 2 root IW 0.8 0.1 1 0.0 [worker/484-fc]ev
10 2 root IW 0.8 0.1 1 0.0 [worker/484-fc]ev
12 2 root IW 0.8 0.1 1 0.0 [rcu_sched]
41 2 root IW 0.8 0.1 1 0.0 [rcu_sched]
43 2 root IW 0.8 0.1 1 0.0 [worker/151-mm]
44 2 root IW 0.8 0.1 1 0.0 [worker/151-mm]
46 2 root SW 0.8 0.1 1 0.0 [hwcd]
47 2 root IW 0.8 0.1 1 0.0 [worker/150-ev]
34 2 root IW 0.8 0.1 1 0.0 [worker/151-ev]
28 2 root IW 0.8 0.1 1 0.0 [worker/150-ev]
33 2 root IW 0.8 0.1 1 0.0 [worker/151-ev]
3 2 root lwc 0.0 0.0 3 0.0 [rcu_gp]
4 2 root rcu 0.0 0.0 1 0.0 [rcu_gp]

```

```
# lscpu
Architecture:          riscv64
Byte Order:            Little Endian
CPU(s):                4
On-line CPU(s) list:  0-3
NUMA:
  NUMA node(s):        1
  NUMA node0 CPU(s):   0-3
# uname
uname                uname26
# uname -a
Linux buildroot 6.1.0 #39 SMP Mon Oct 7 13:43:23 EEST 2024 riscv64 GNU/Linux
# free -h
              total        used         free       shared    buff/cache   available
Mem:          483372      12604      421908           28        48966      418524
Swap:          0             0             0
```