Programmable Packet Scheduling

Adrian, Akash, Anshuman, Cassandra, Kabir

Accelerated Programmable Packet Scheduling

Adrian, Akash, Anshuman, Cassandra, Kabir

PIFO trees allow programmable packet scheduling

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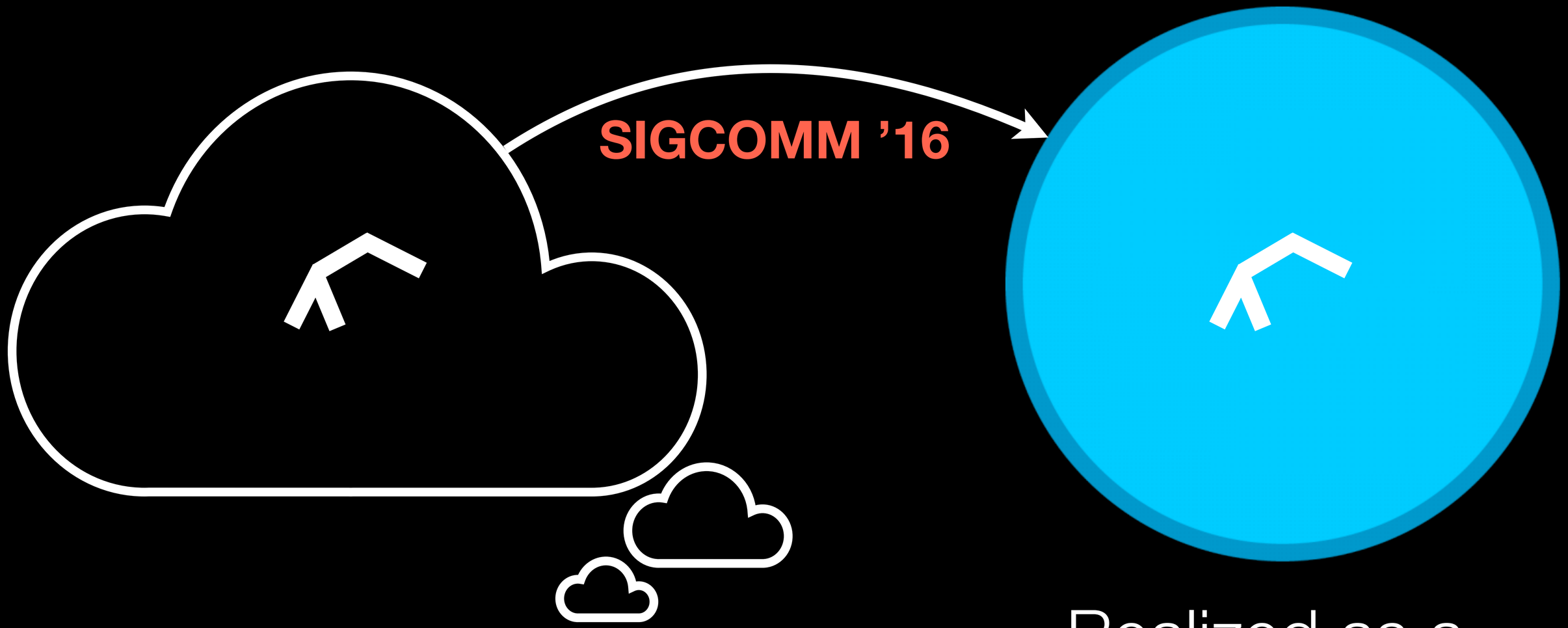
The human dream

PIFO trees allow programmable packet scheduling

The human dream

Realized as a hardware tree

PIFO trees allow programmable packet scheduling

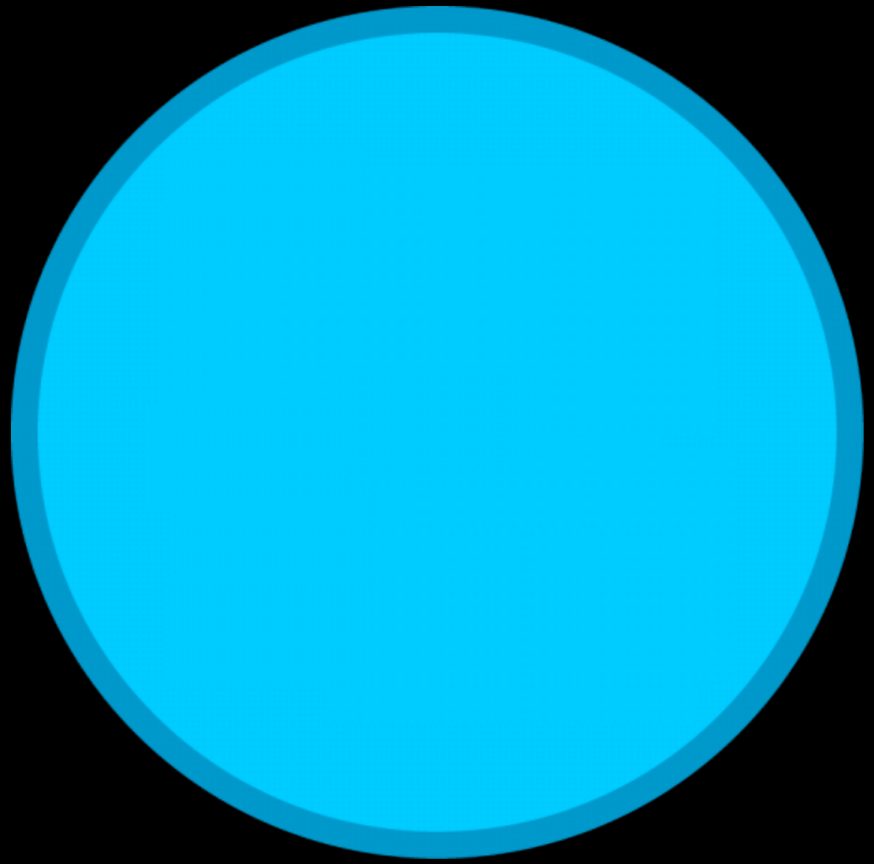


The human dream

Realized as a hardware tree

PIFO trees allow programmable packet scheduling

SIGCOMM ’16



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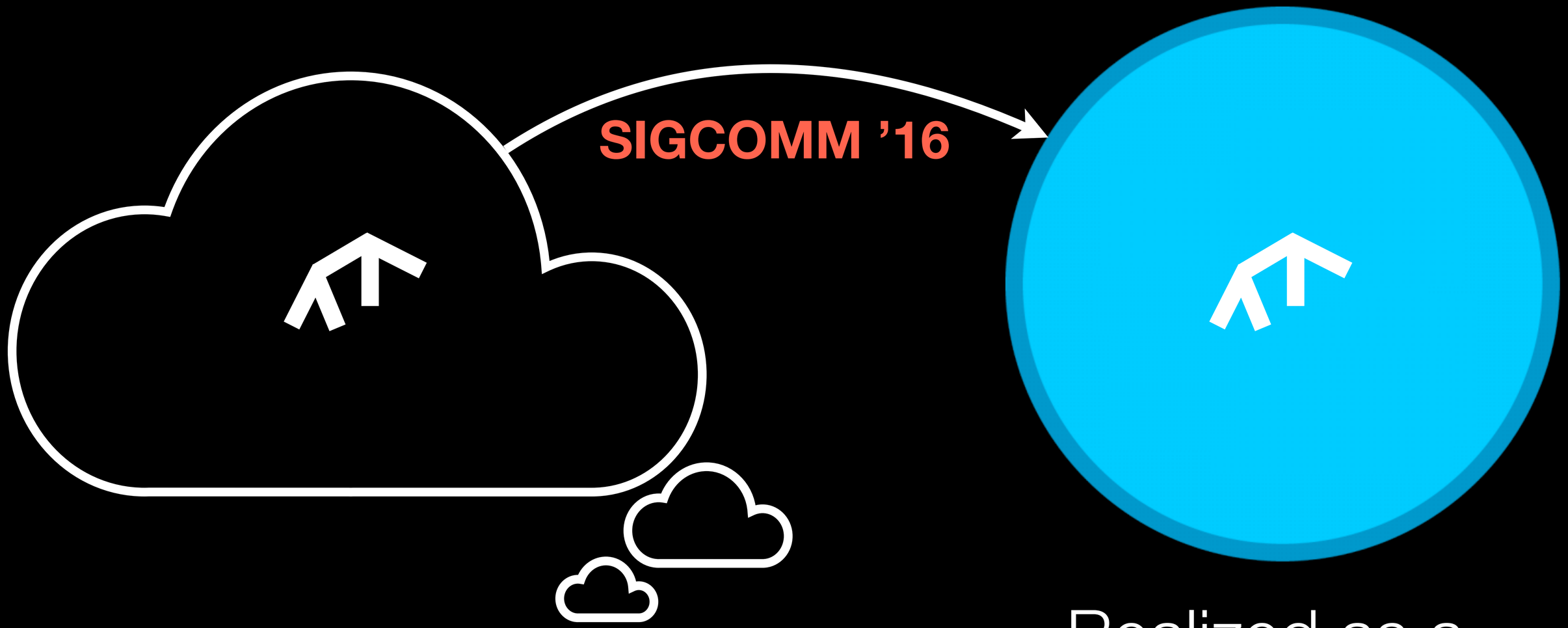

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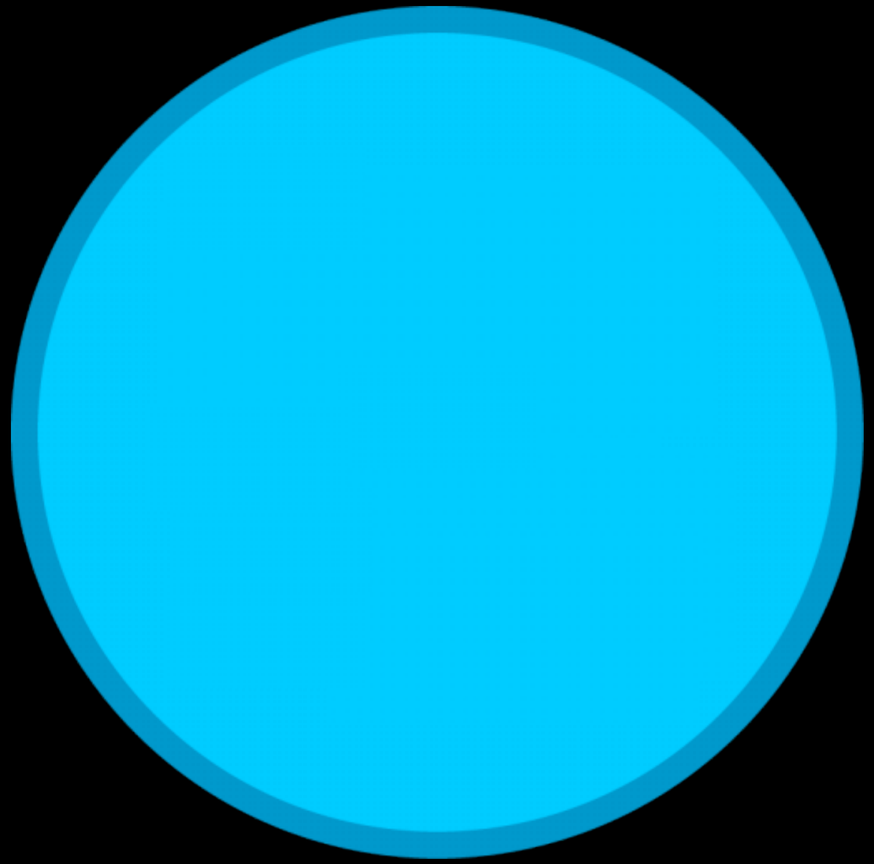

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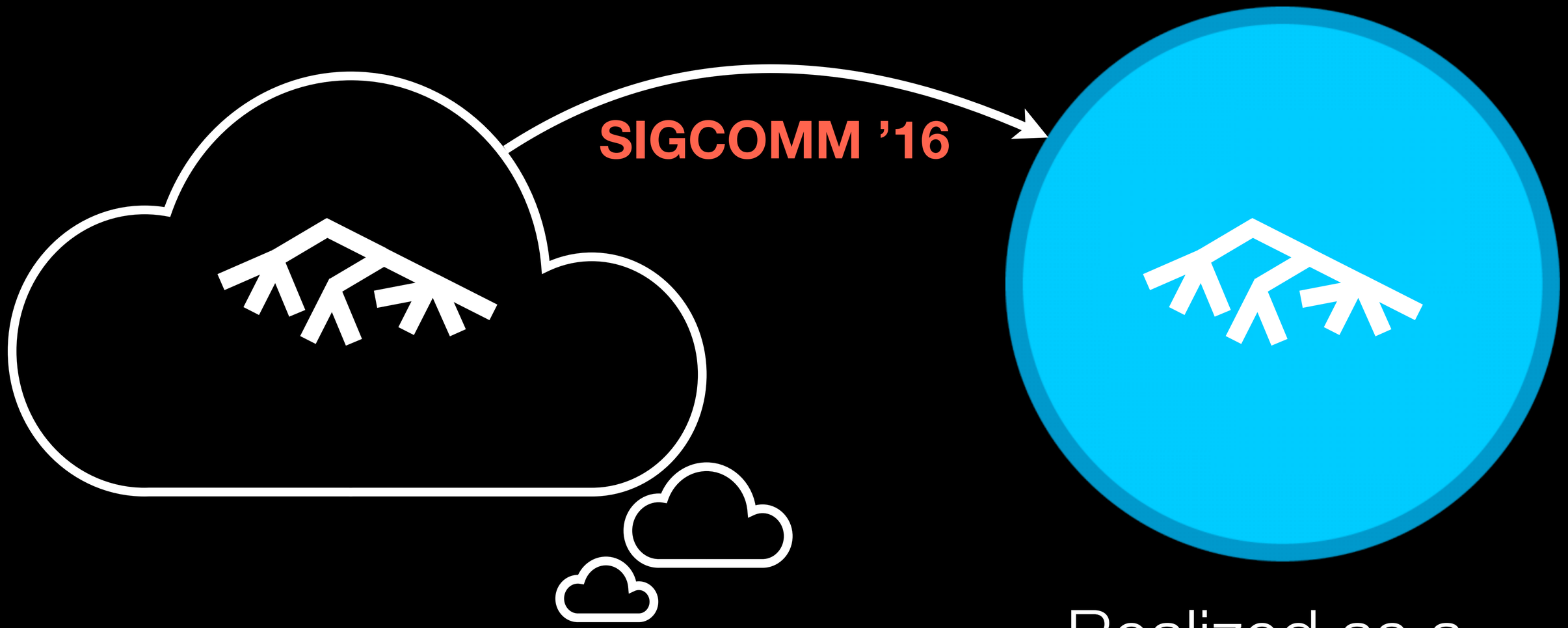


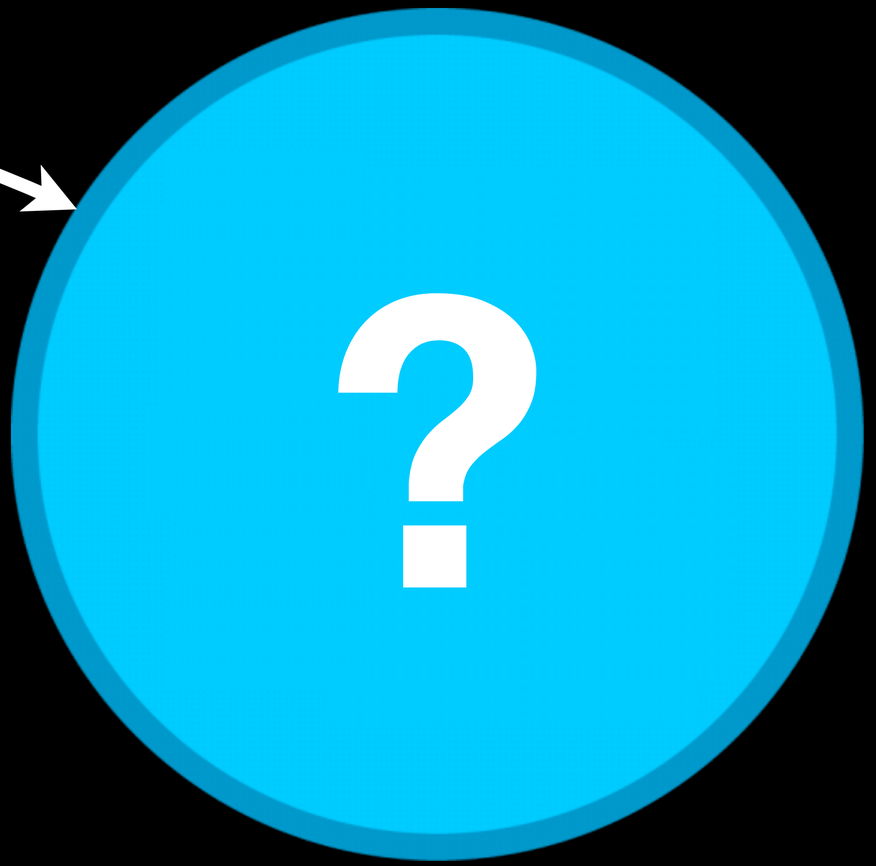
The human dream

Realized as a hardware tree

A human needs a
range of trees

A human needs a *range* of trees

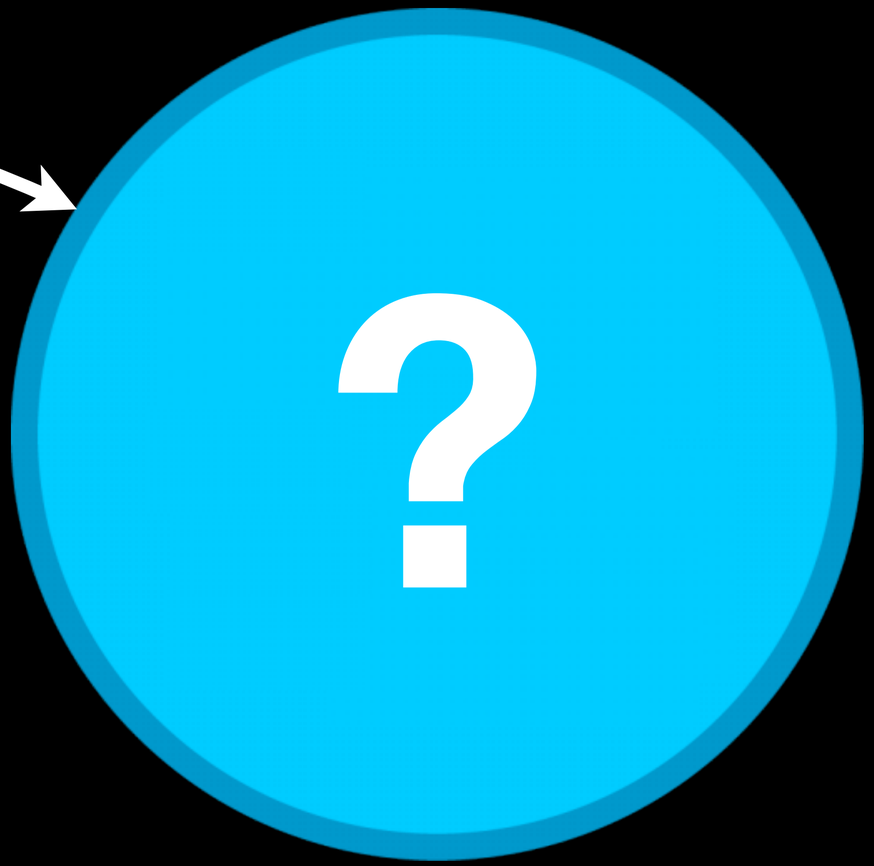
The hardware wants to support *one* tree



A human needs a *range* of trees

The hardware wants to support *one* tree

Seeking a general way to deploy PIFO trees!



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Seeking a general way to deploy PIFO trees!

OOPSLA ’23

A human needs a *range* of trees

The hardware wants to support *one* tree

A general way to deploy PIFO trees

A general way to deploy PIFO trees

Let the hardware support some tree

A general way to deploy PIFO trees

Let the human program against some tree

Let the hardware support some tree

A general way to deploy PIFO trees

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A general way to deploy PIFO trees

Let the human program against some tree

Let the hardware support some tree

A general way to deploy PIFO trees

A human gets a *range* of trees

The hardware supports *one* tree

Original context: internet switch

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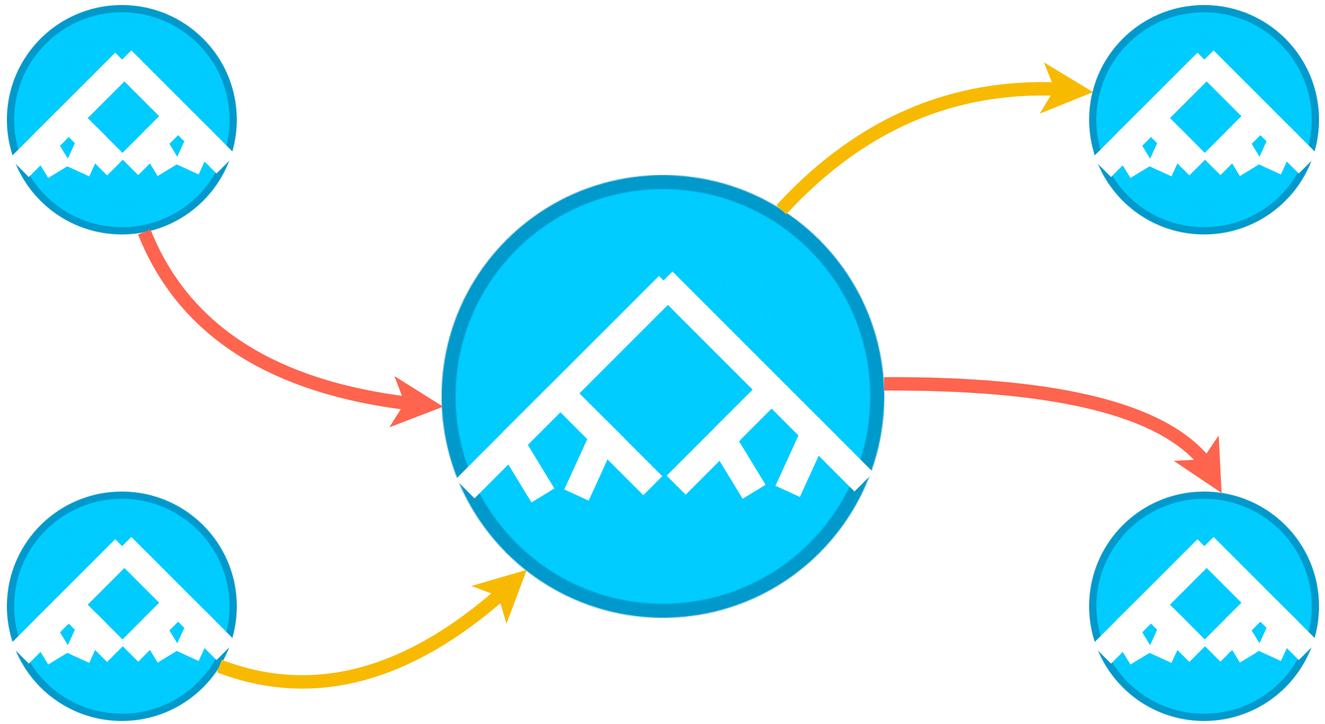
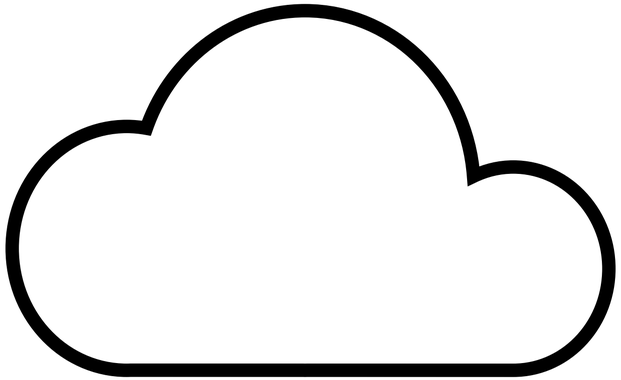
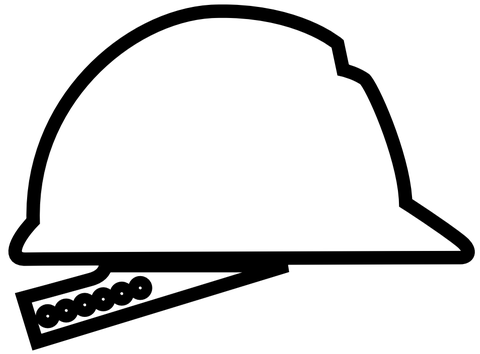
Original context: internet switch



New context: smartNIC guarding a server

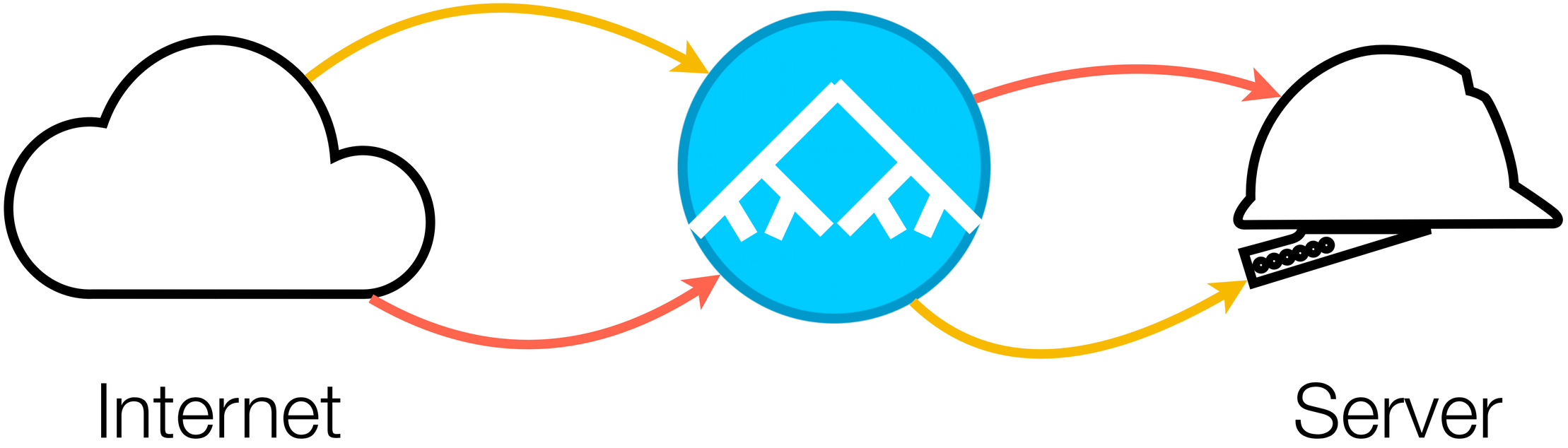


Internet

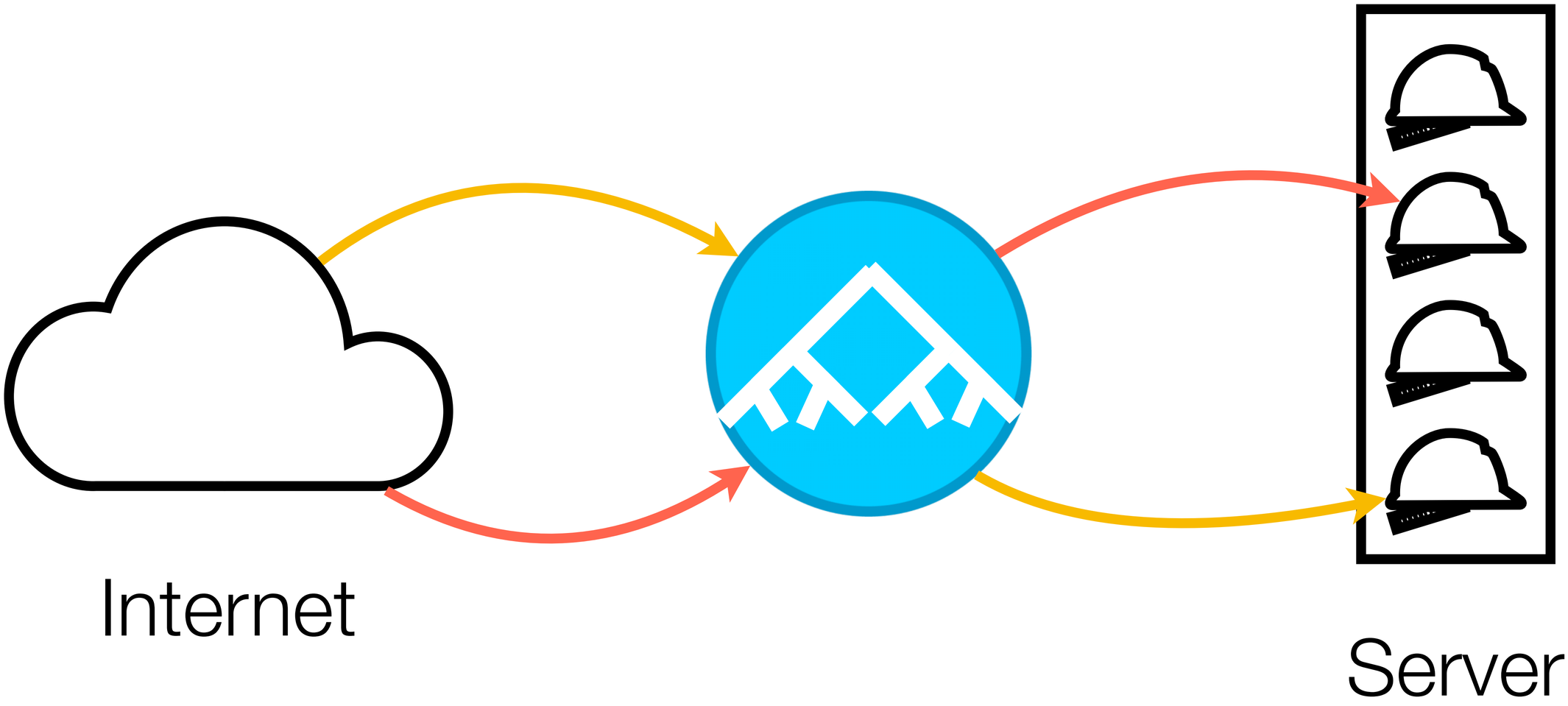


Server

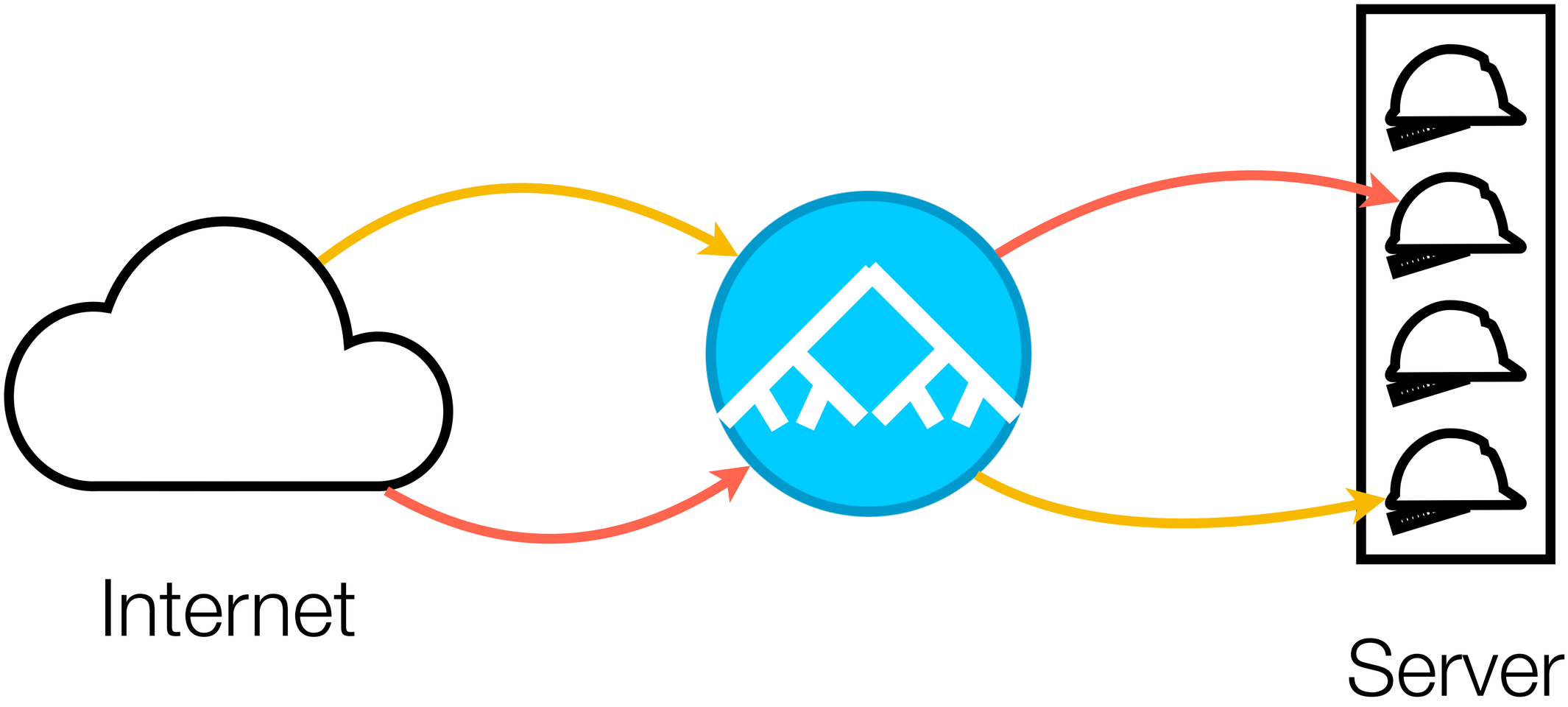
New context: smartNIC guarding a server



New context: smartNIC guarding a server



When I say SmartNIC, you say FPGA!



When I say SmartNIC, you say FPGA!

Workflow

```
rr(strict(A, B), C, D)
```

Workflow

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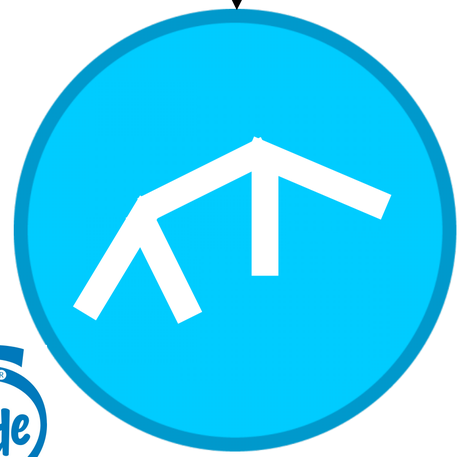

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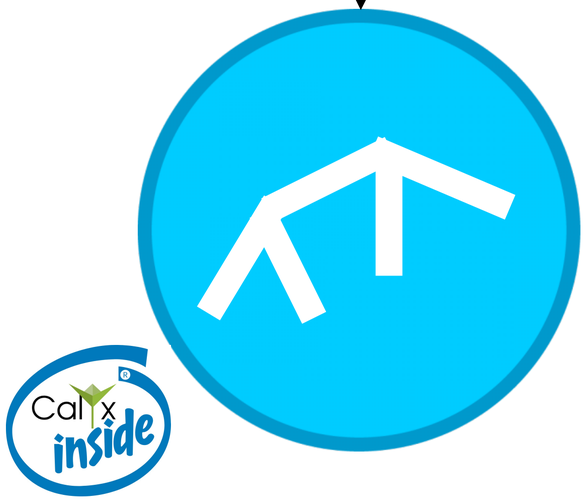
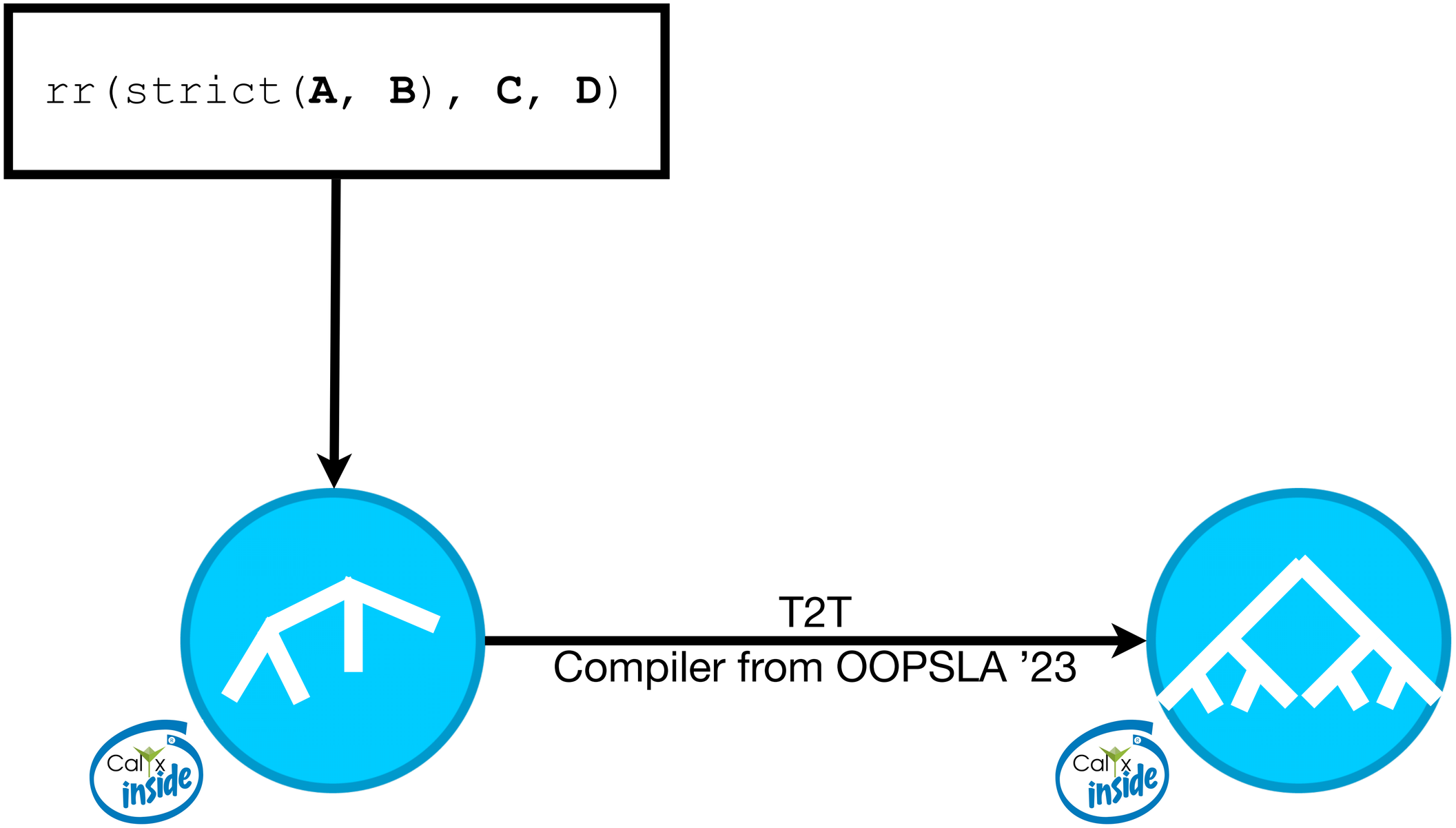
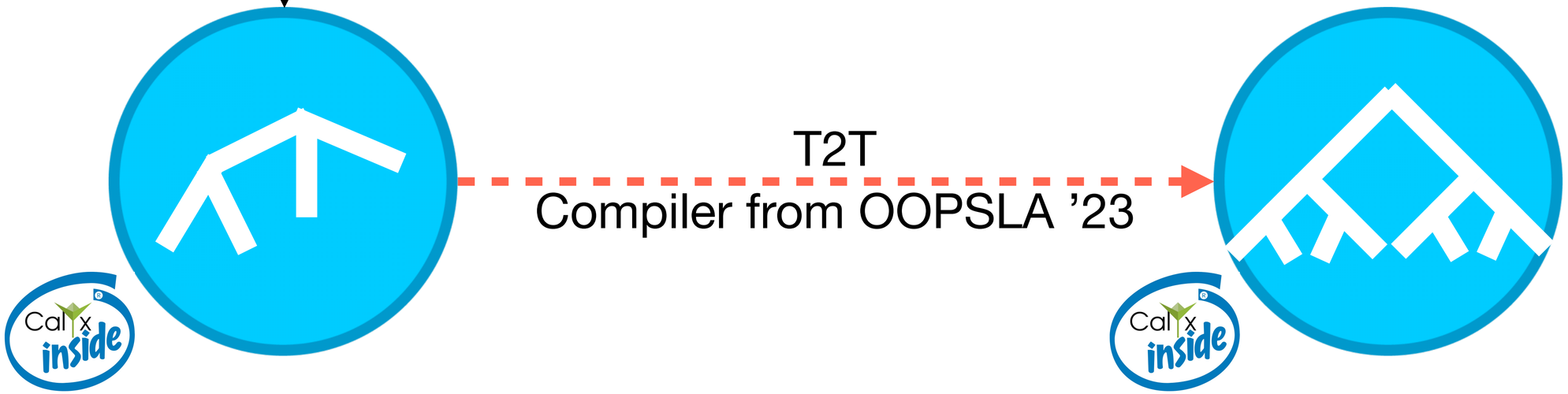


Workflow


rr(strict(A, B), C, D)
T2T
Compiler from OOPSLA '23
Calyx inside
Calyx inside

Workflow

```
rr(strict(A, B), C, D)
```



Workflow

```
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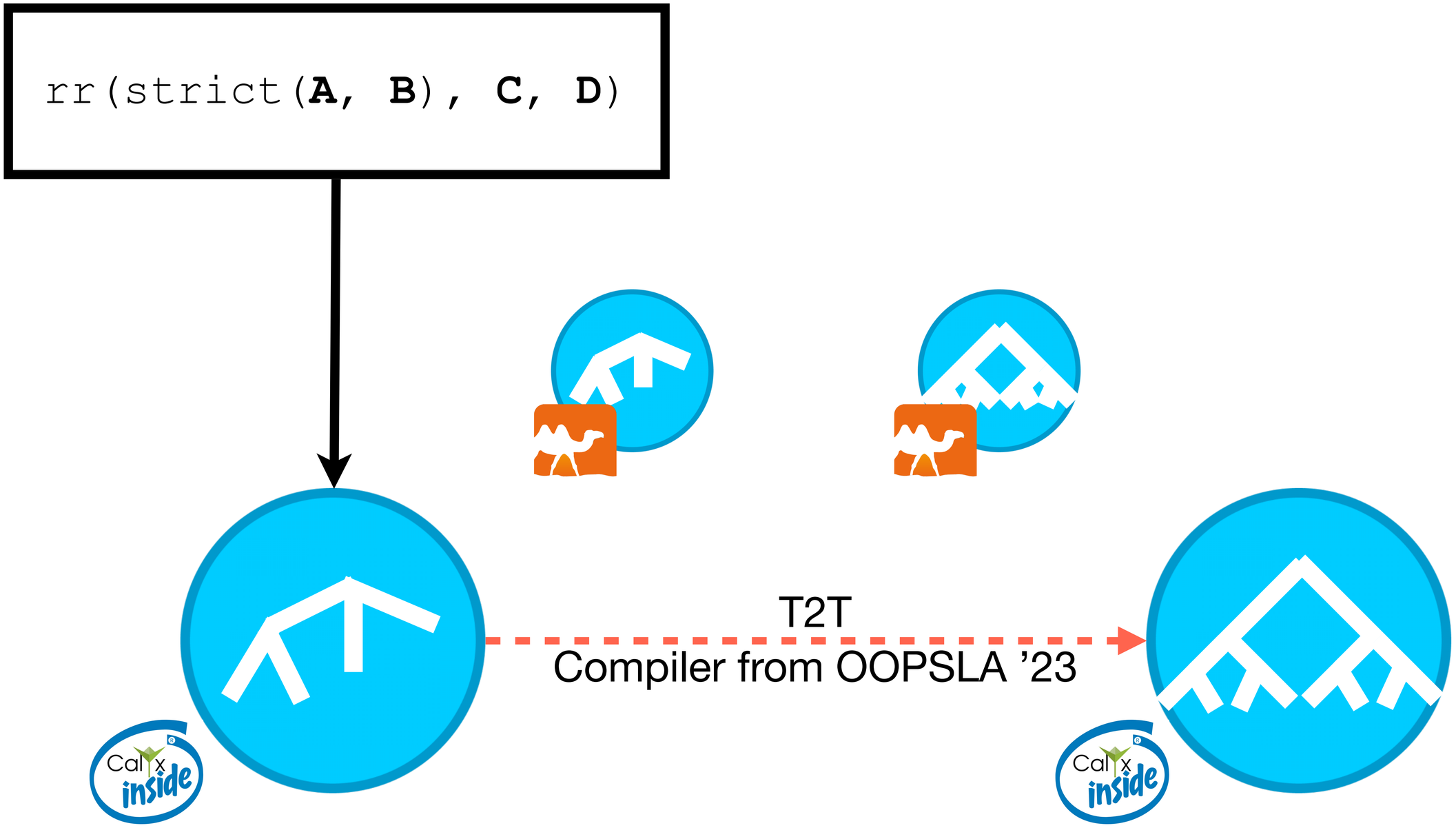
Workflow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Calyx inside
Calyx inside

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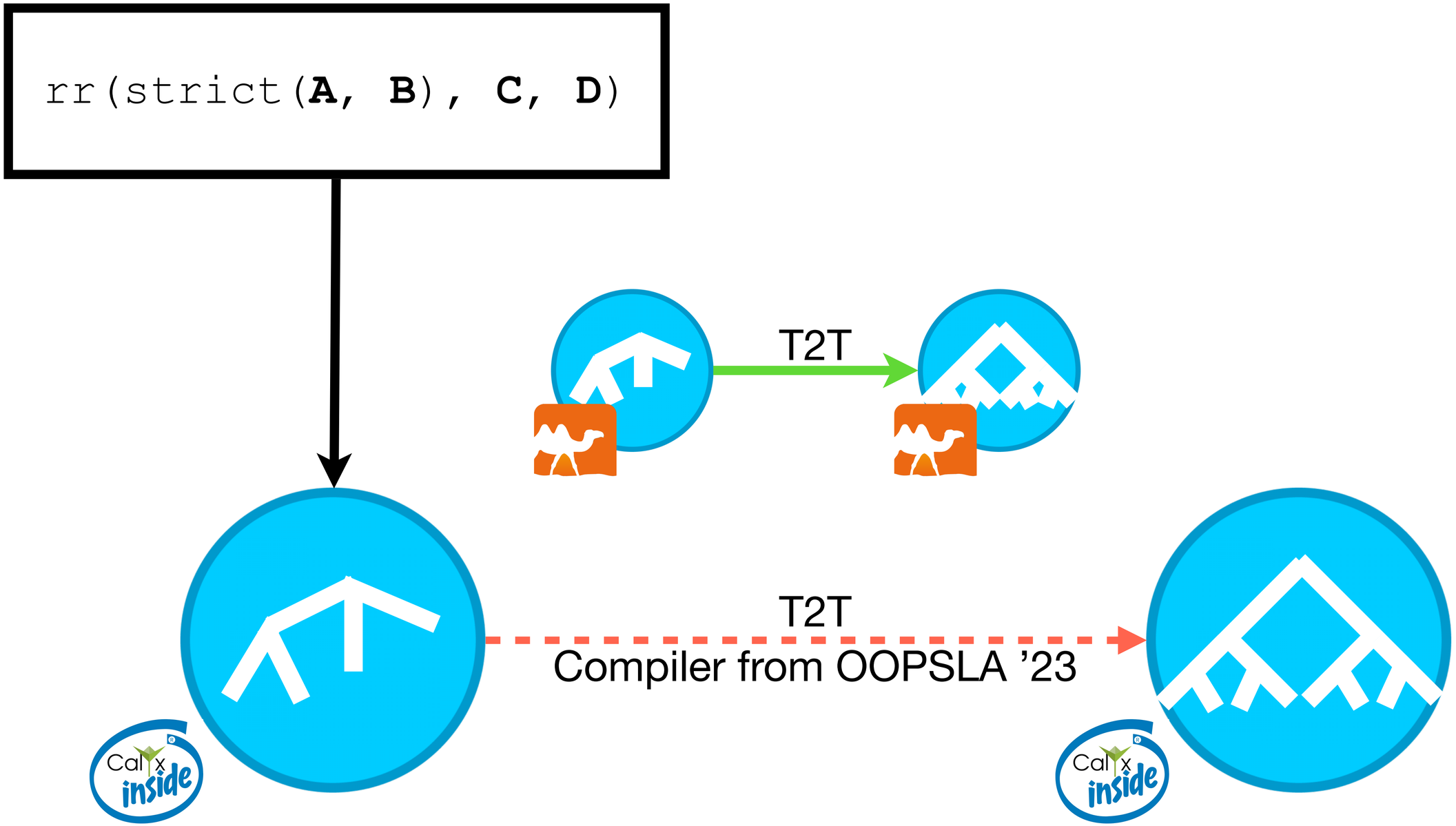
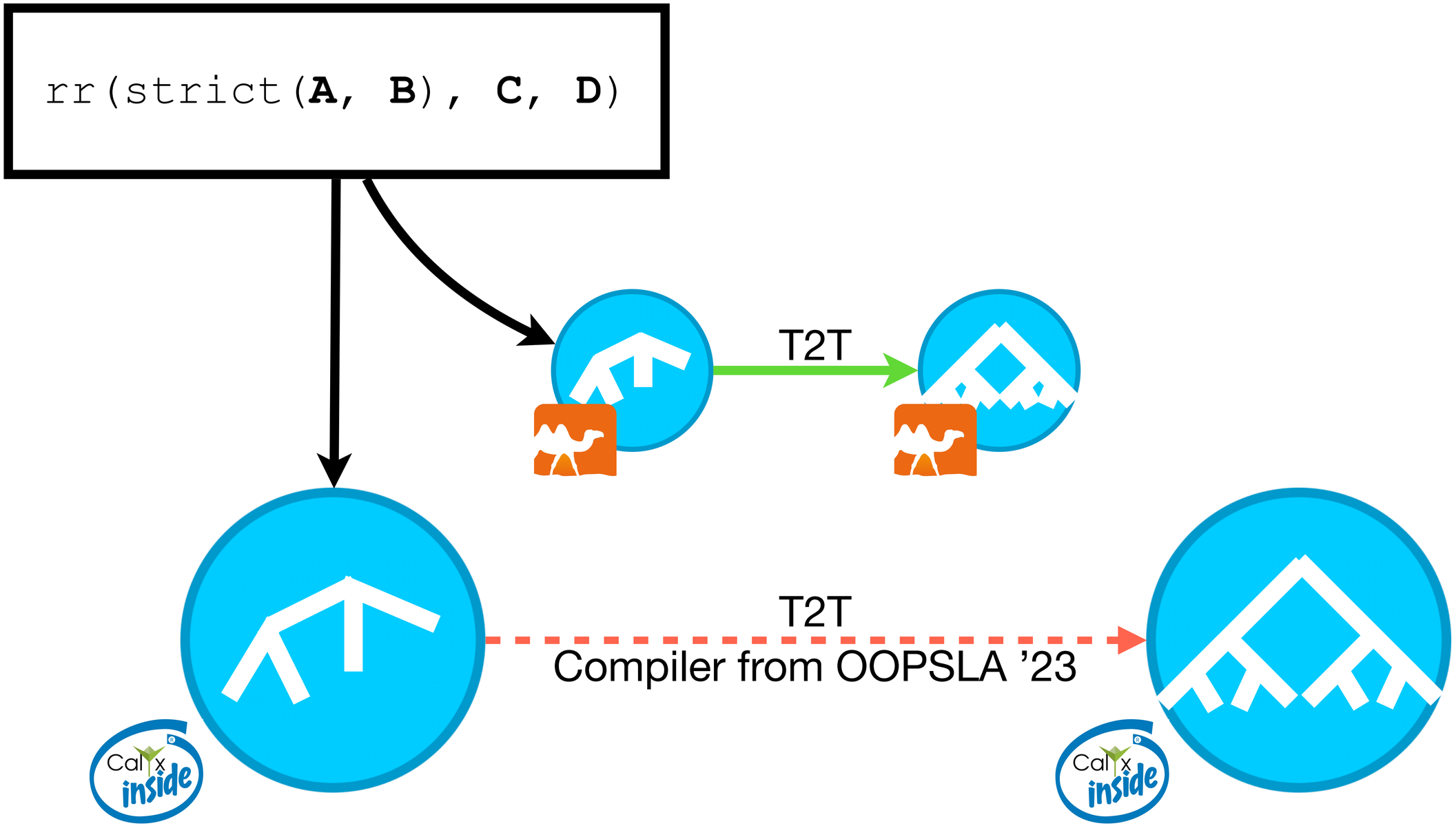
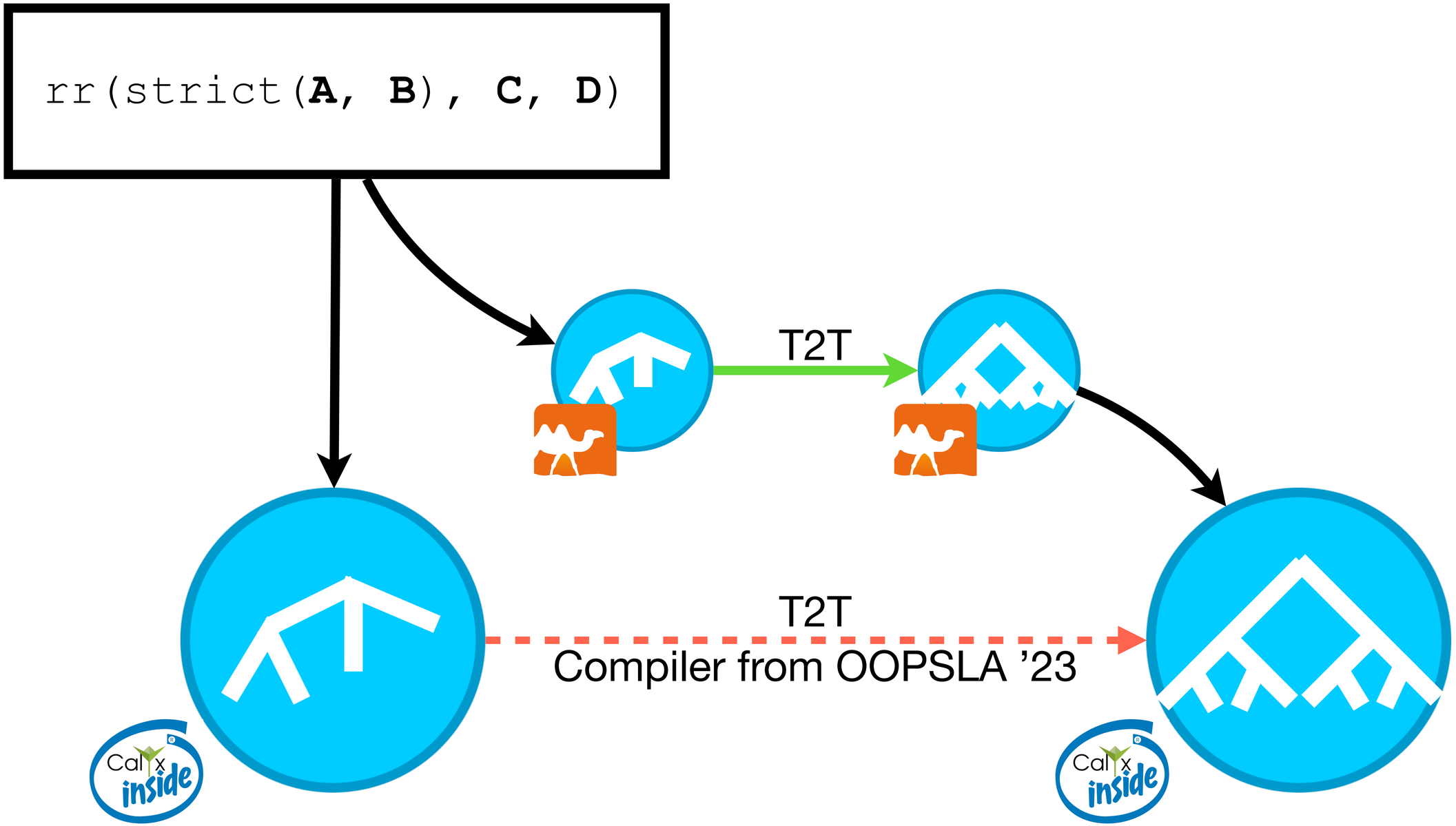


Workflow



Workflow



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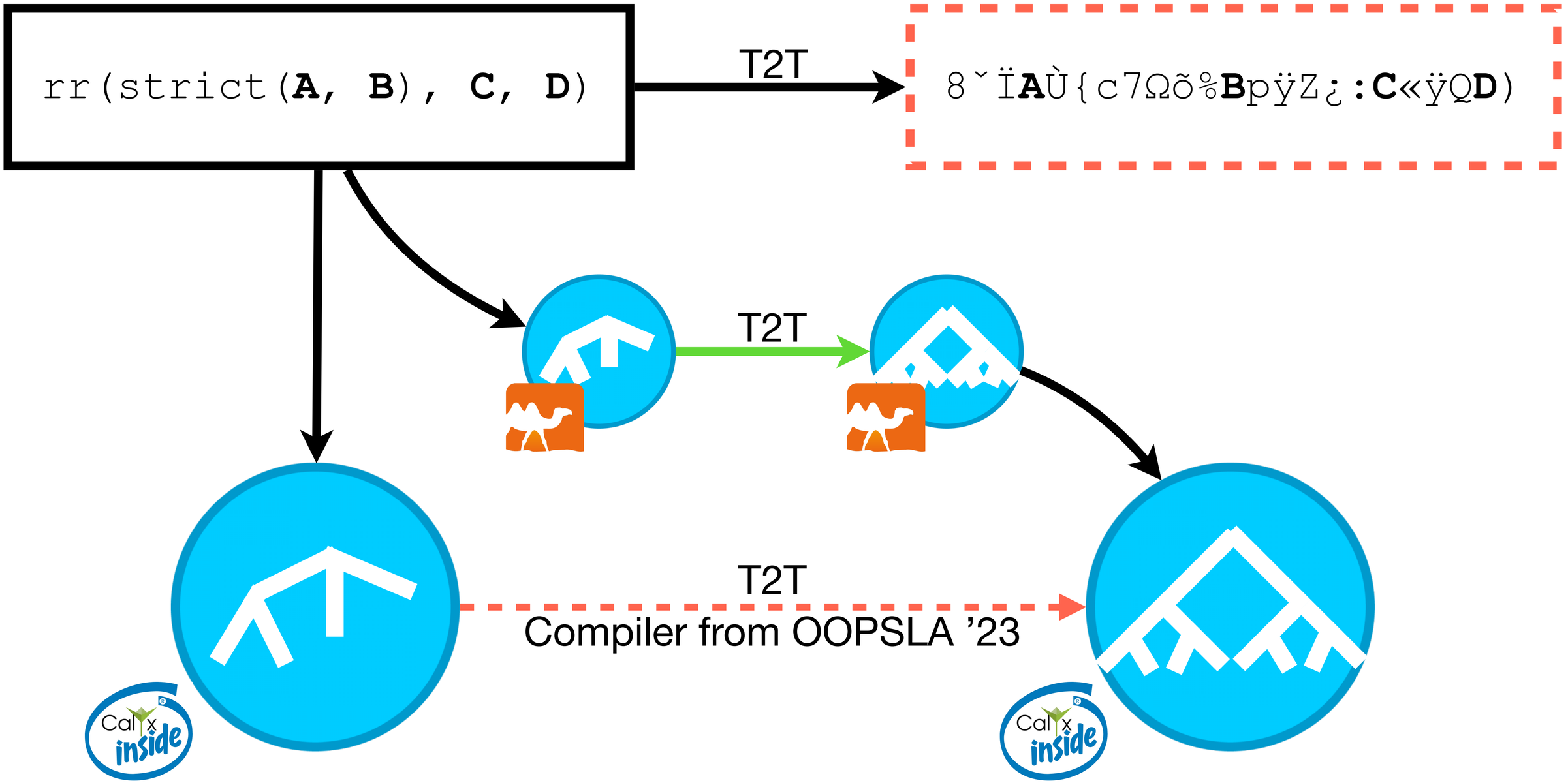
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T2T
8˘ÏAÙ{c7Ωõ%BpÿZ¿:C«ÿQD)
T2T
T2T
Compiler from OOPSLA ’23
Calyx inside
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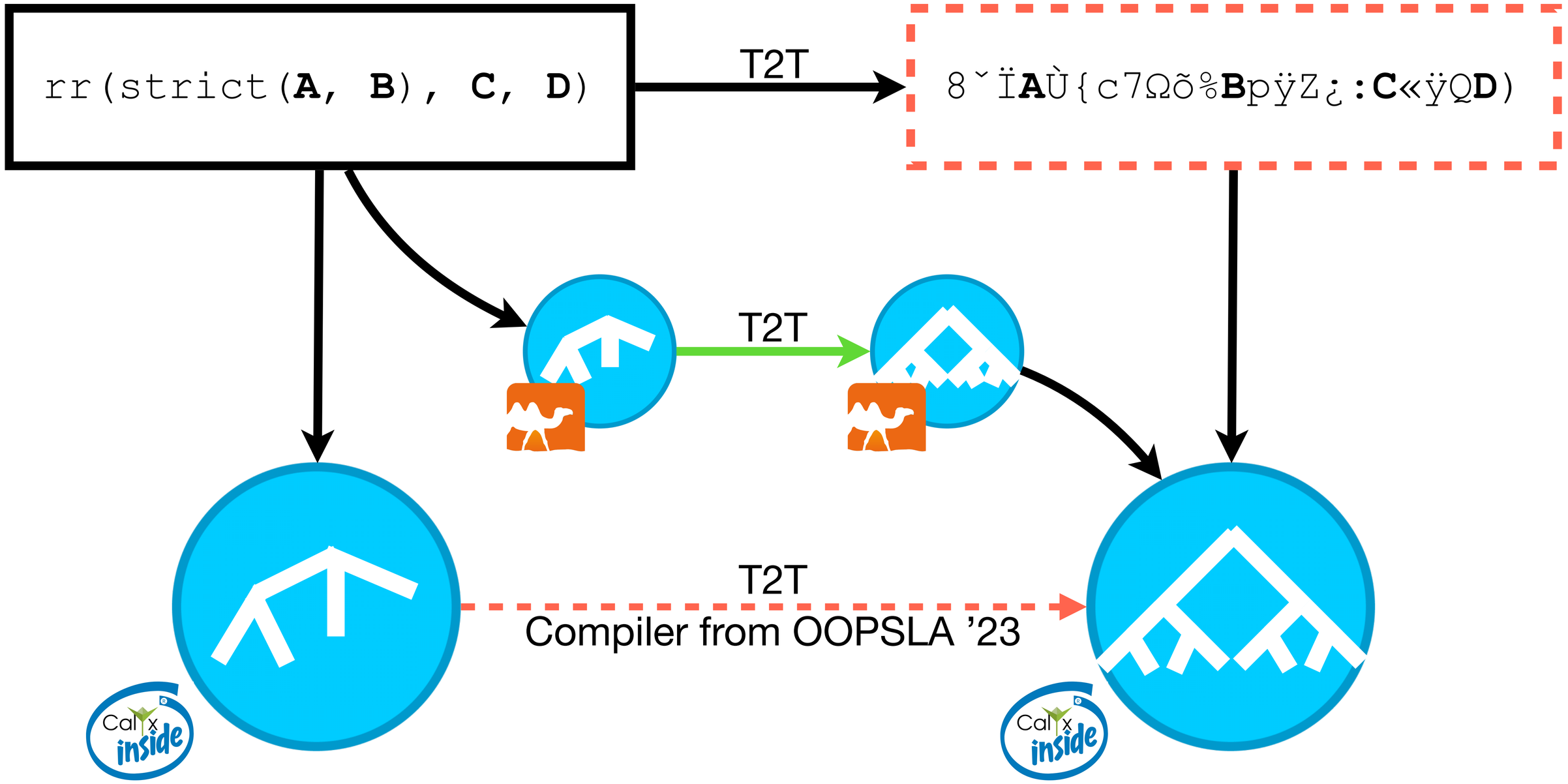
Workflow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T2T
T2T
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Calyx inside
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