Introductory and Advanced Topics on P4 Programmable Data Plane Switches

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Lab 9: Storing Arbitrary Data using Registers

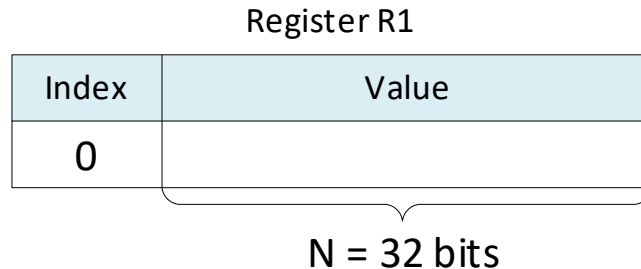# Using a Single Cell Register in P4

- The P4 language provides registers to save arbitrary data.

- Registers are stateful elements used to store values longer than the time it takes to process a packet.

- Multiple packets can access registers.

- Registers are global memory resources meaning that any match-action tables can reference them.

- The control plane and data plane can read and write register values.

Declaring a Single Cell Register

- The syntax below shows how to declare a single cell register in P4.
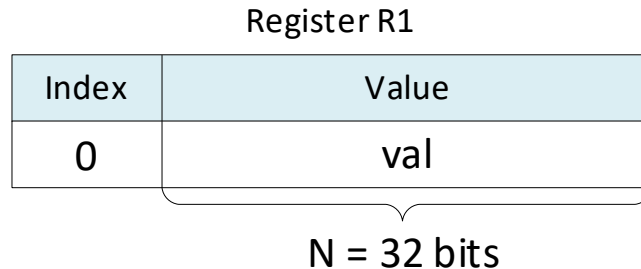
```
register<bit<N>>(1) R1;
```

- Register R1 contains a single cell that stores a value of N bits in position 0.

Register R1

Index	Value
0	

N = 32 bits

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Writing a Single Cell Register

- The syntax below shows how to store the value *val* in register R1 at position 0.

```
R1.write(0,val)
```

Register R1

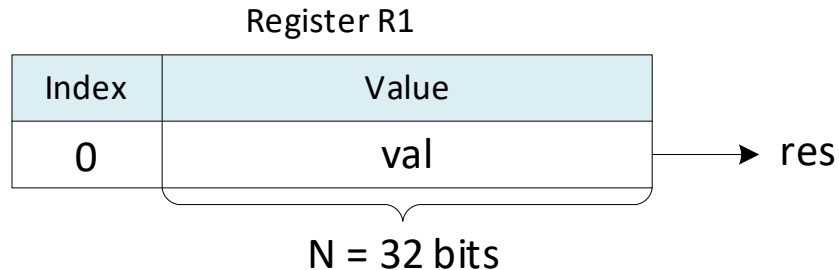| Index	Value
0	val

N = 32 bits

Reading a Single Cell Register

- The syntax below shows how to retrieve the value *val* in register R1 at position 0.

```
R1.read(res,0)
```

- Note that the value *val* is stored in the variable *res*.

Register R1

Index	Value
0	val

→ res

N = 32 bits

Lab Topology and Objectives

- The topology consists of four hosts: h1, h2, h3, and h4; one P4 switch: s1; and one legacy switch: s2.

- In this lab, the user will create a P4 program that stores the last source IP address.

- The user will also read, write, and reset the register value from the control plane.