

Week 08 Studio Mutable Data

**CS1101S AY21/22 Semester 1
Studio 05E**

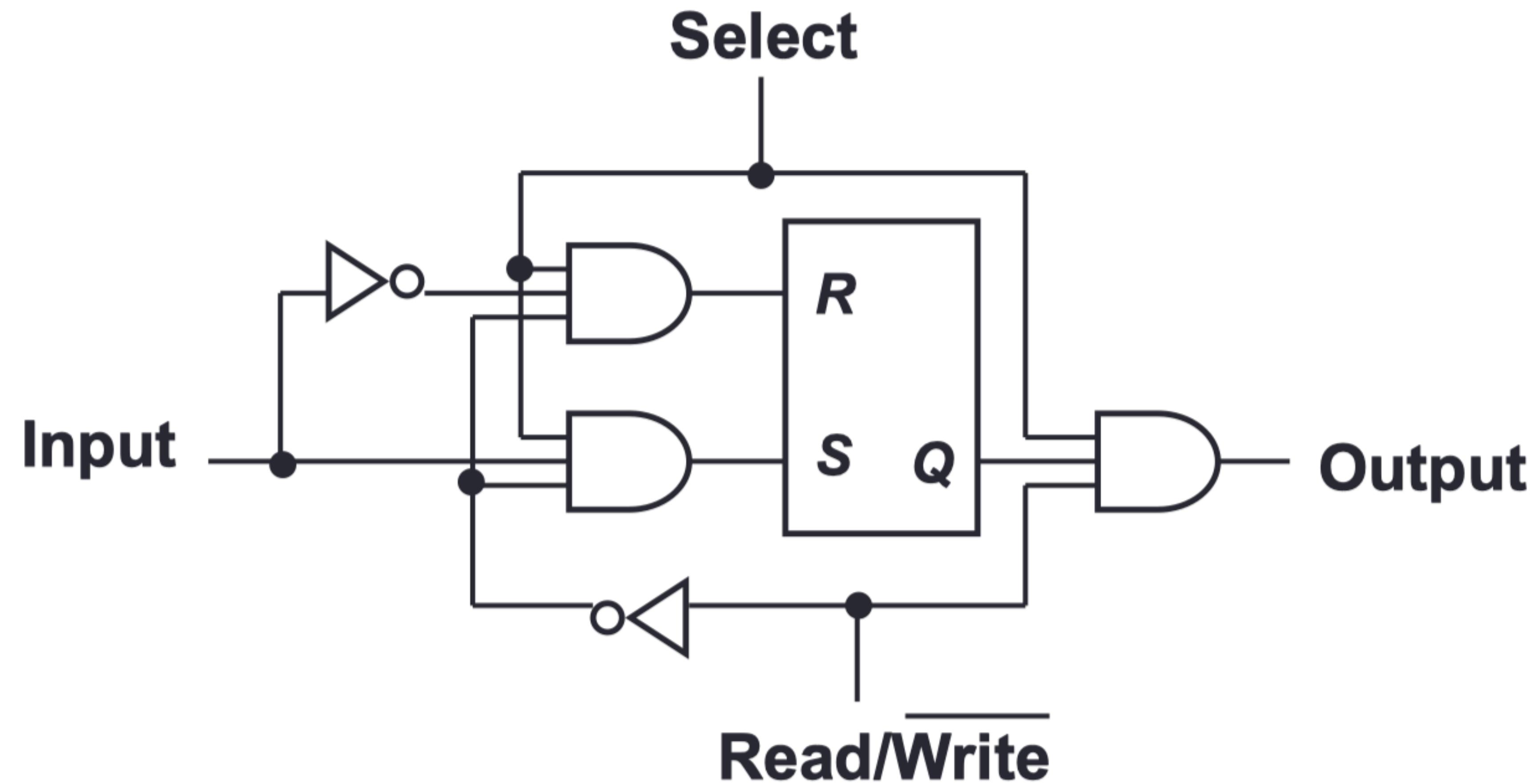
04 Oct 2021

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Admin

- Contact tracing (QR code + class photo)
- How was midterms?
- Robotics-related Source Academy assignments:
 - M7 Robot Trials
 - M8A Finding ELDRIC, M8B Repairing ELDRIC
 - Q8 PID Stop (quite a bounty!)
- Mastery Check
- Drawing of environment model

Recap



States

What Is It?

- Previously in Source Academy: constants
 - Single state, memoryless/stateless
 - No past, no future :((
 - **const <name> = <expression>;**
- Now: variables
 - **let <name> = <expression>;**



Programmers

$x = x + 1$



Mathematicians

States

Pros

- Allows objects to behave differently over time
- Implement loops
- Update variables with function calls
- New data structure: arrays
- Better algorithms
 - Faster binary search and quick sort

States

Cons

- Substitution model breaks down!
 - Will consider variable as just a name for a value
 - But assignment considers a variable as a “contianer”
- Possible remedy?
 - Environment model

Mutable Data

What Is It?

- Constant declaration: immutable data
- Variable assignment: mutable data
- Mutable pairs
 - `set_head(p, x)`
 - `set_tail(p, x)`
- Beware: when will we create new data structures?

Mutable Data

Destructive Append

- ```
function d_append(xs, ys) {
 if (is_null(xs)) {
 return ?;
 } else {
 ...
 return ?;
 }
}
```

# Mutable Data

## Destructive Map

- ```
function d_map(fun, xs) {
  if (is_null(xs)) {
    ...
  } else {
    ...
  }
}
```

Mutable Data

Destructive Operations

- It's called destructive for a reason!!
- `const a = list(1, 2, 3);`
- `set_tail(tail(tail(a)), a);`
- `length(a);`
- Too much recursion :(((

Any Questions?



Work on Your Robot!