Flow Graphs in Analytics
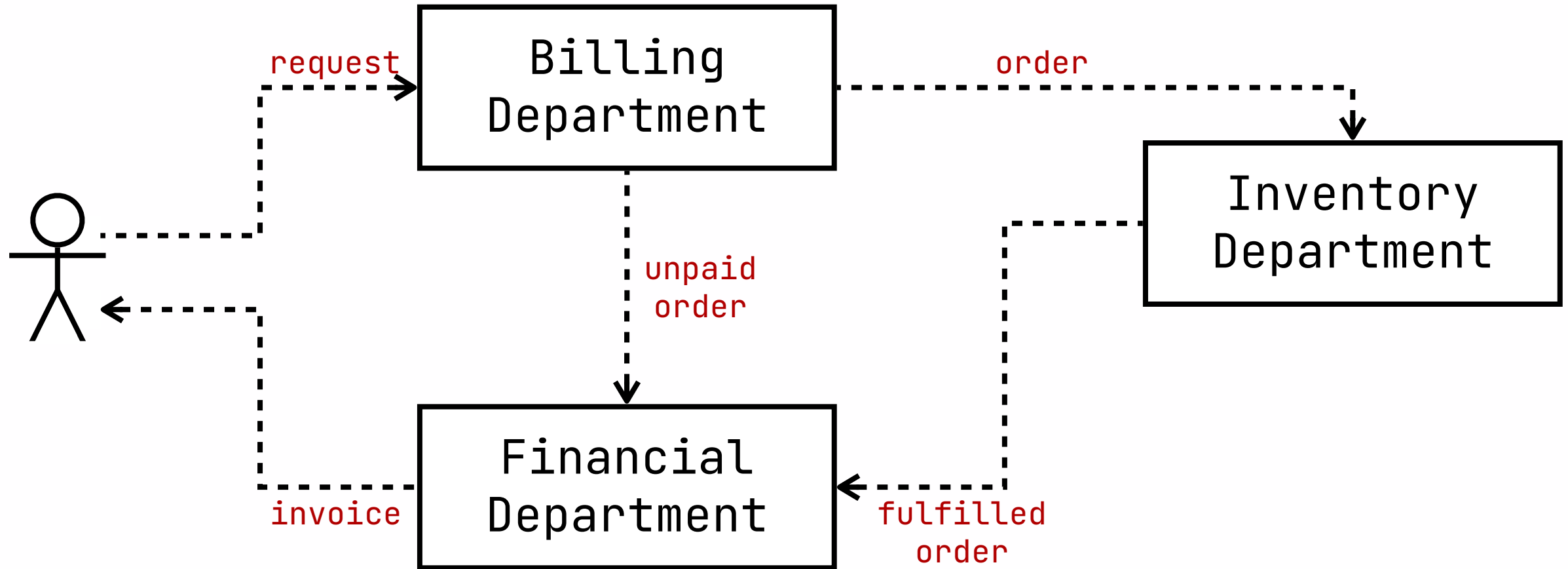
Software Systems — Design — L6T2
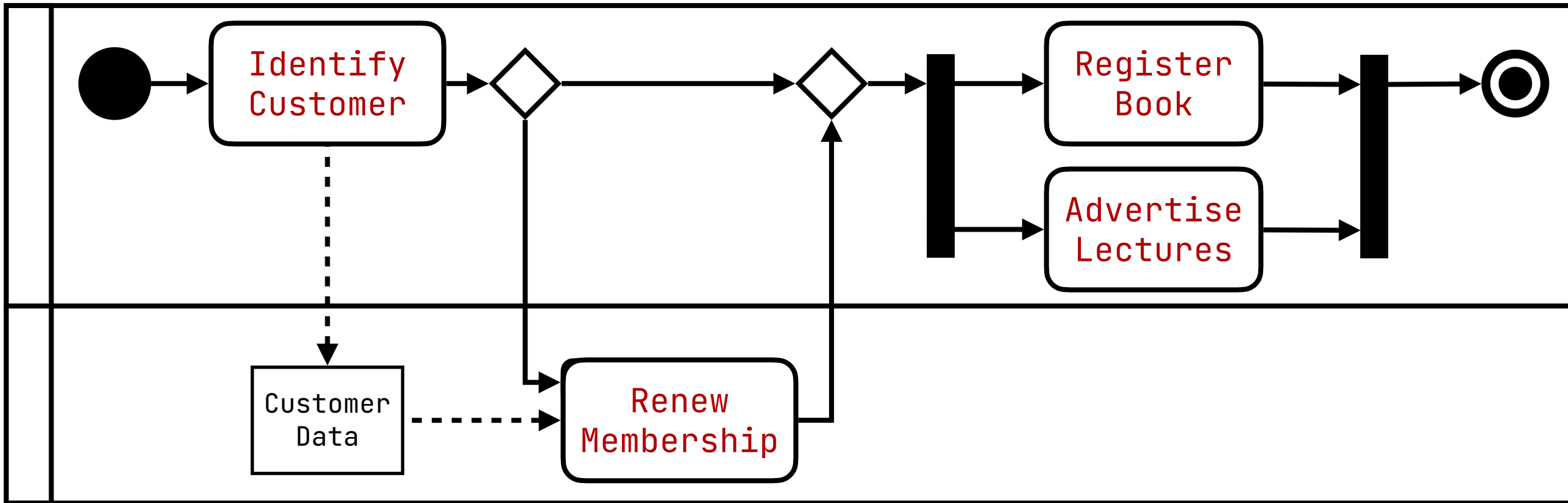
Dr. Vadim Zaytsev aka @grammarware, November 2020
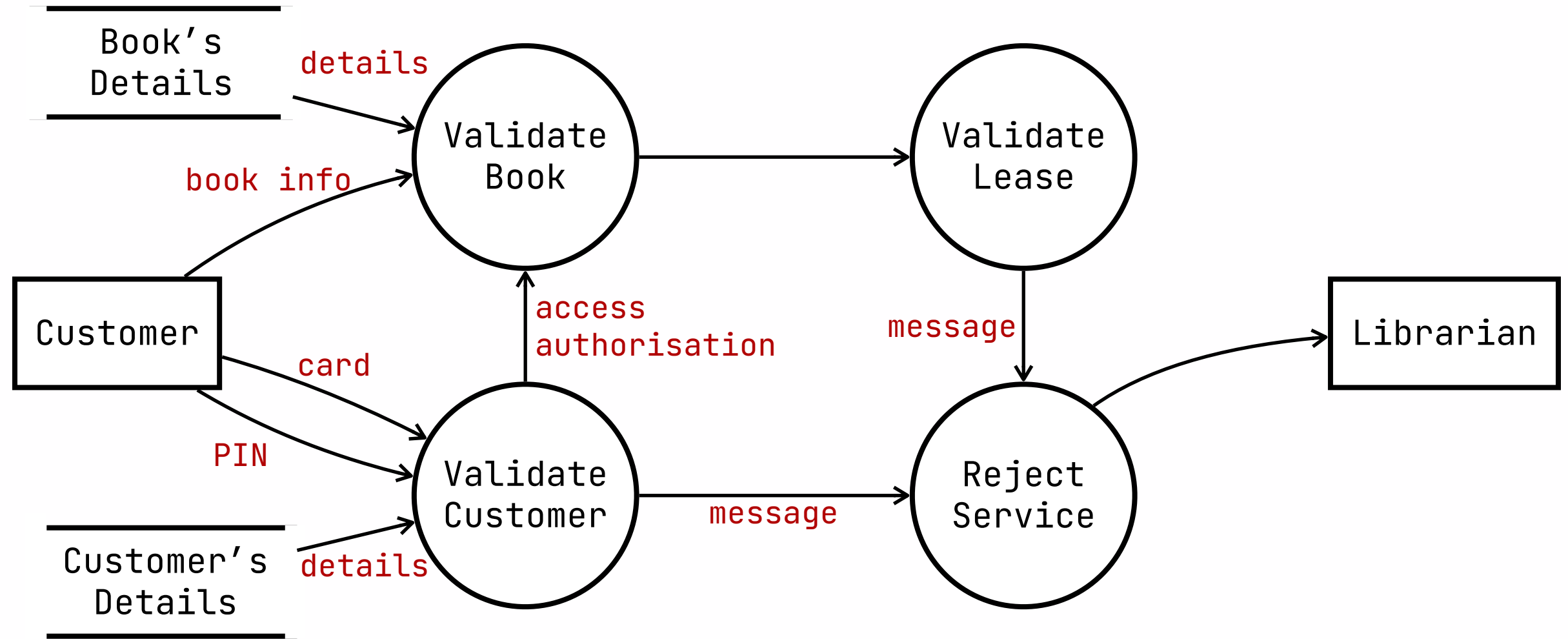
Formal Methods & Tools

Information Flow Diagram

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Activity Diagram

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Data Flow Diagram, Yourdon style

Book's Details

details → Validate Book → Validate Lease

book info →

Customer

card → Validate Customer

PIN →

access authorisation ↑

Customer's Details

details →

message ↓

message → Reject Service → Librarian

Yourdon, Constantine, *Structured Design*, 1979

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TensorFlow / TensorBoard
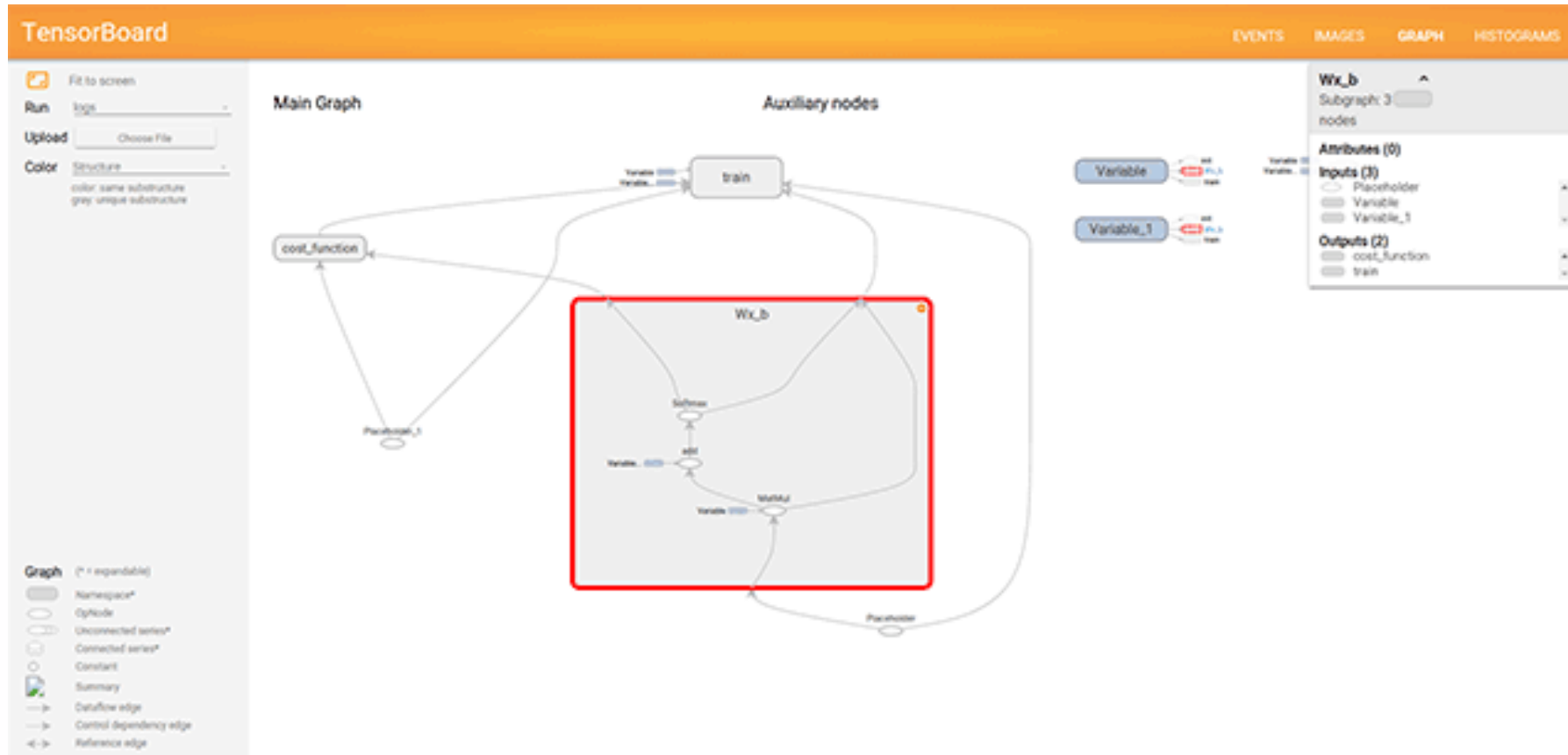
Sergey Kovalev, *Visualizing TensorFlow Graphs with TensorBoard*, 2016

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Data Flow Graph of Code

```java
public static int max(int x, int y) {
    int result = x;
    if (x < y)
        result = y;
    return result;
}
```
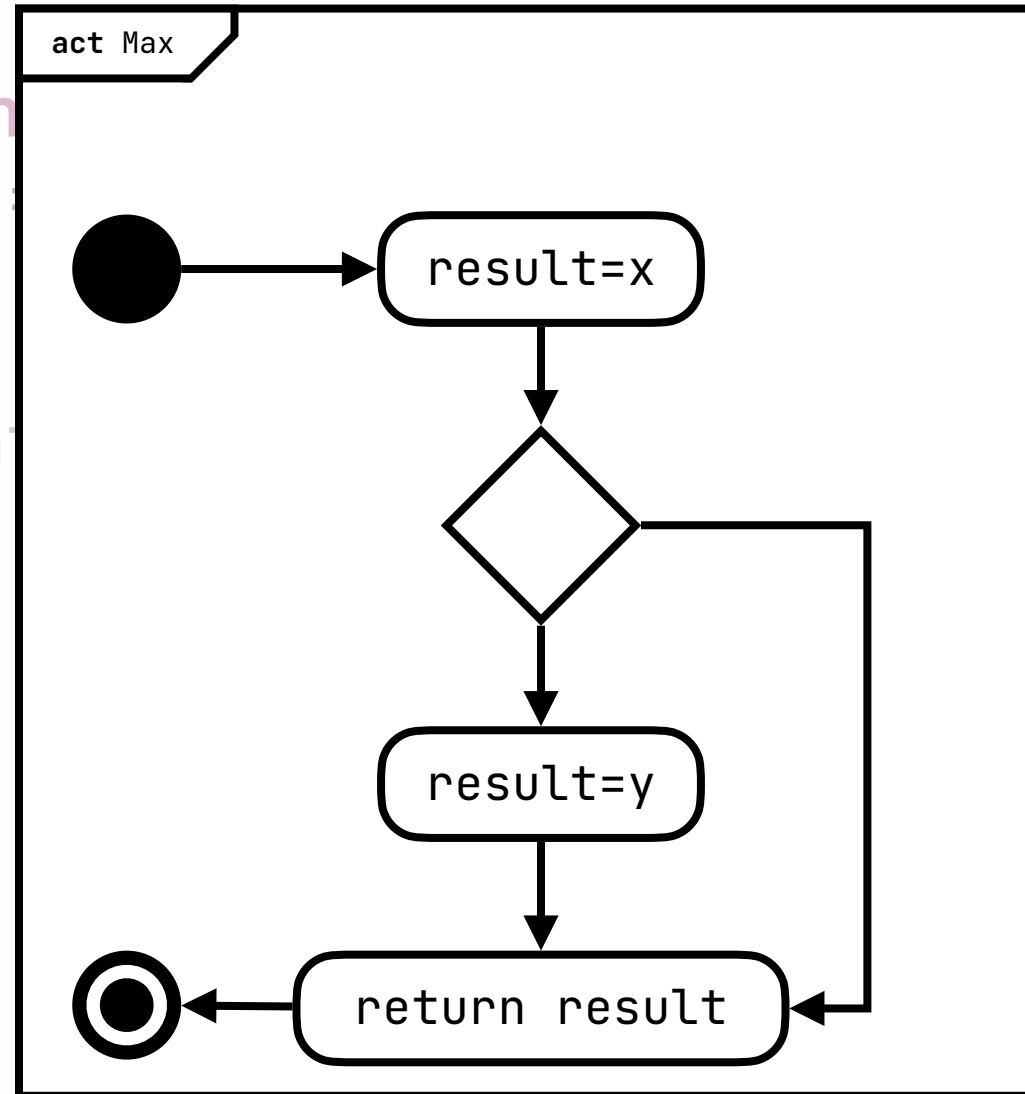
Control Flow Graph of Code

```
public static int max(int x, int y) {
    int result = x;
    if (x < y)
        result = y;
    return result;
}
```
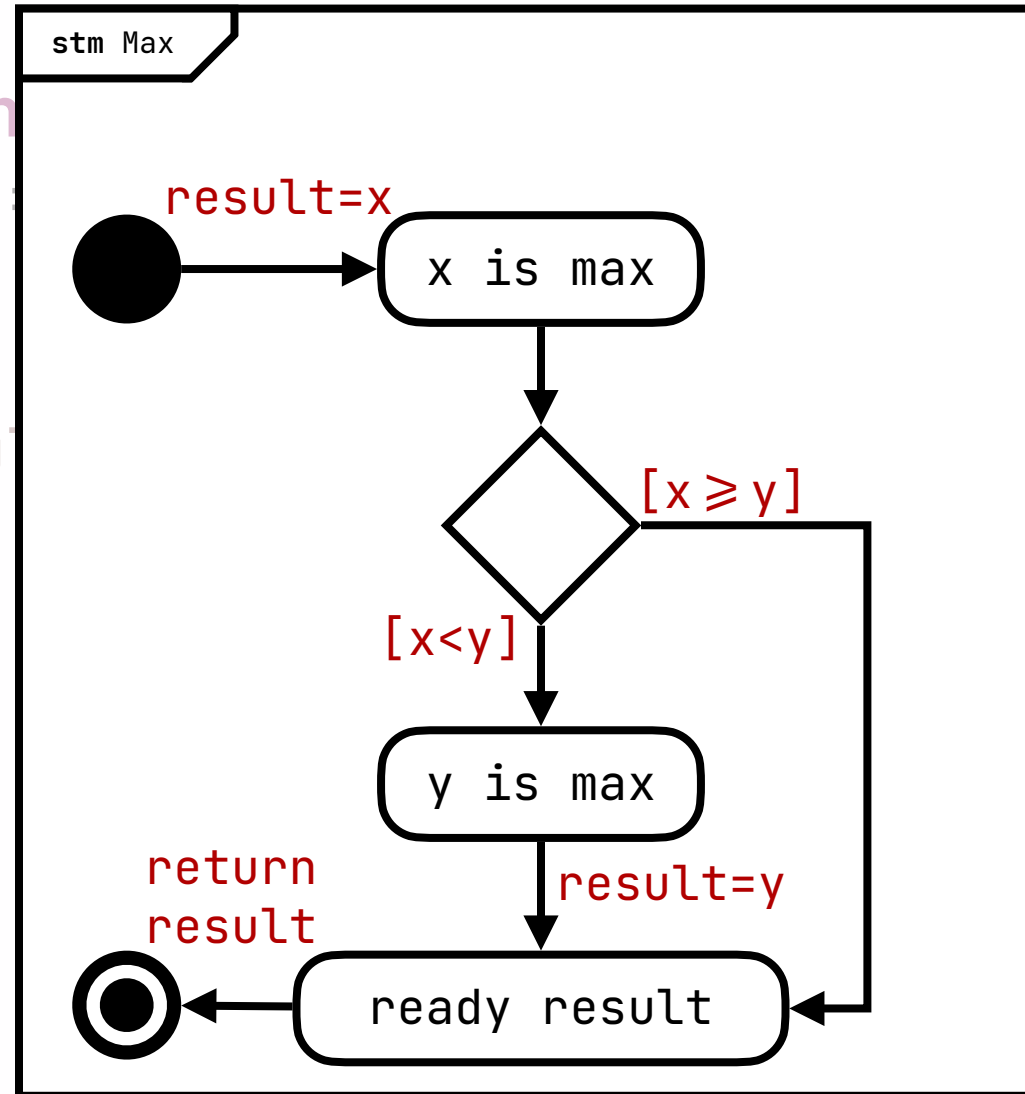
Control Flow Graph of Code

```
public static in
    int result
    if (x < y)
        result =
    return resu
}
```


act Max

result=x

result=y

return result

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Control Flow Graph of Code

```
public static in
    int result
    if (x < y)
        result =
    return resu
}
```


stm Max

result=x

x is max

[x ≥ y]

[x<y]

y is max
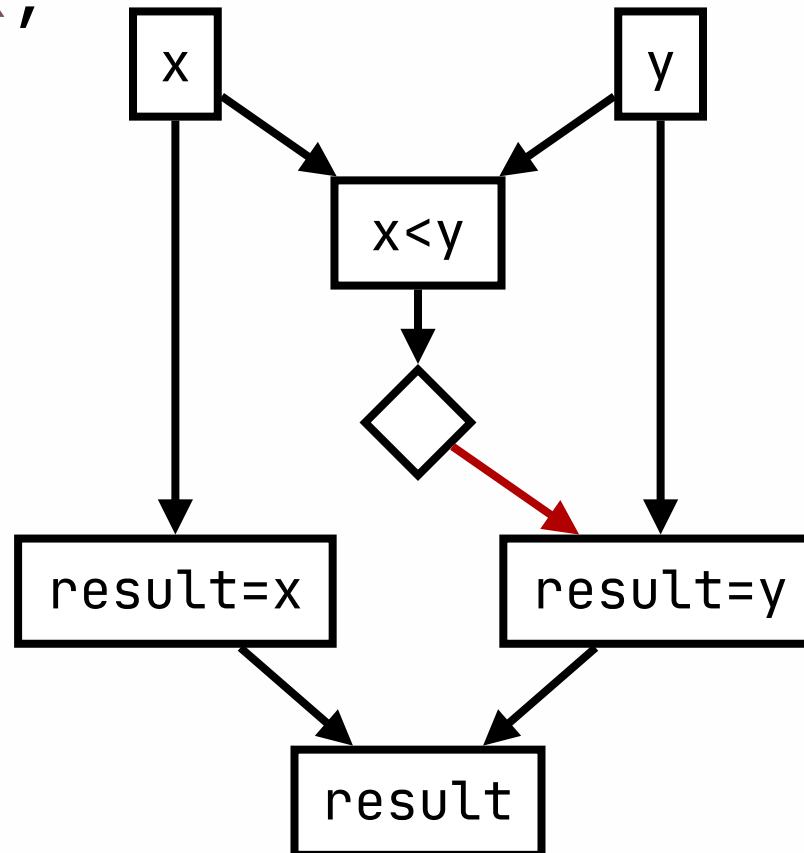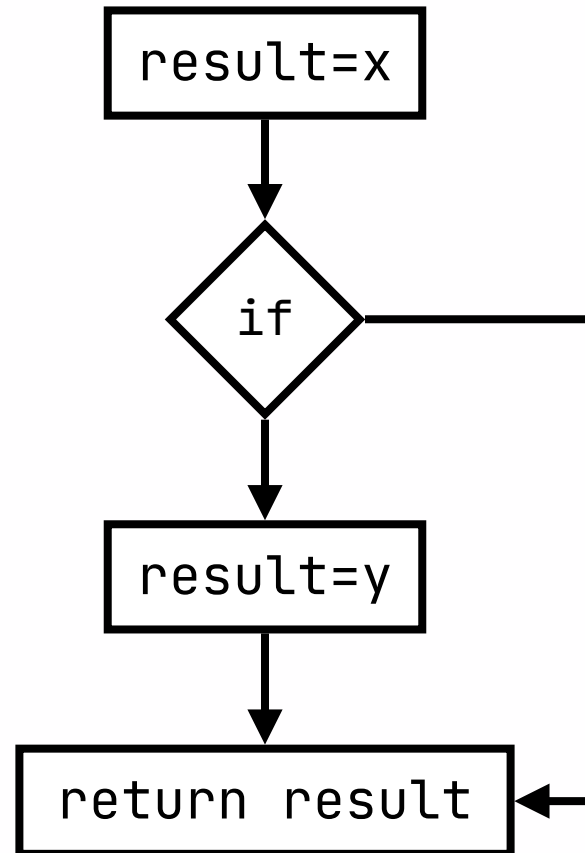
result=y

return result

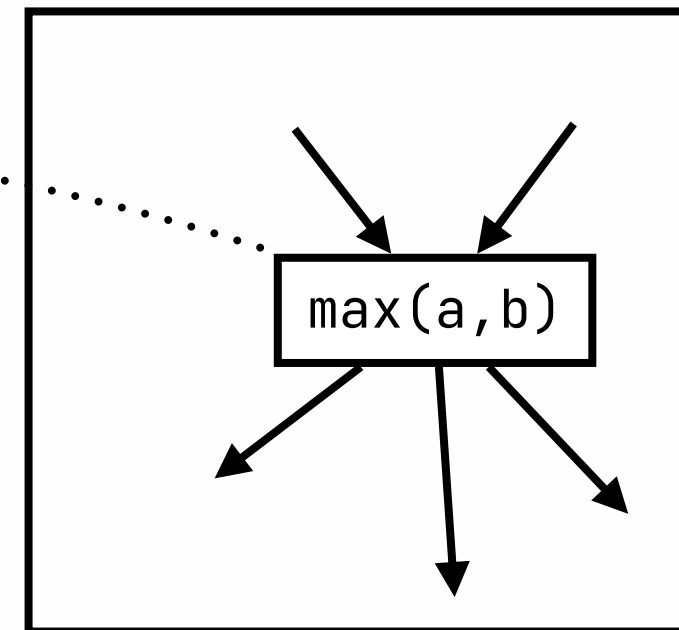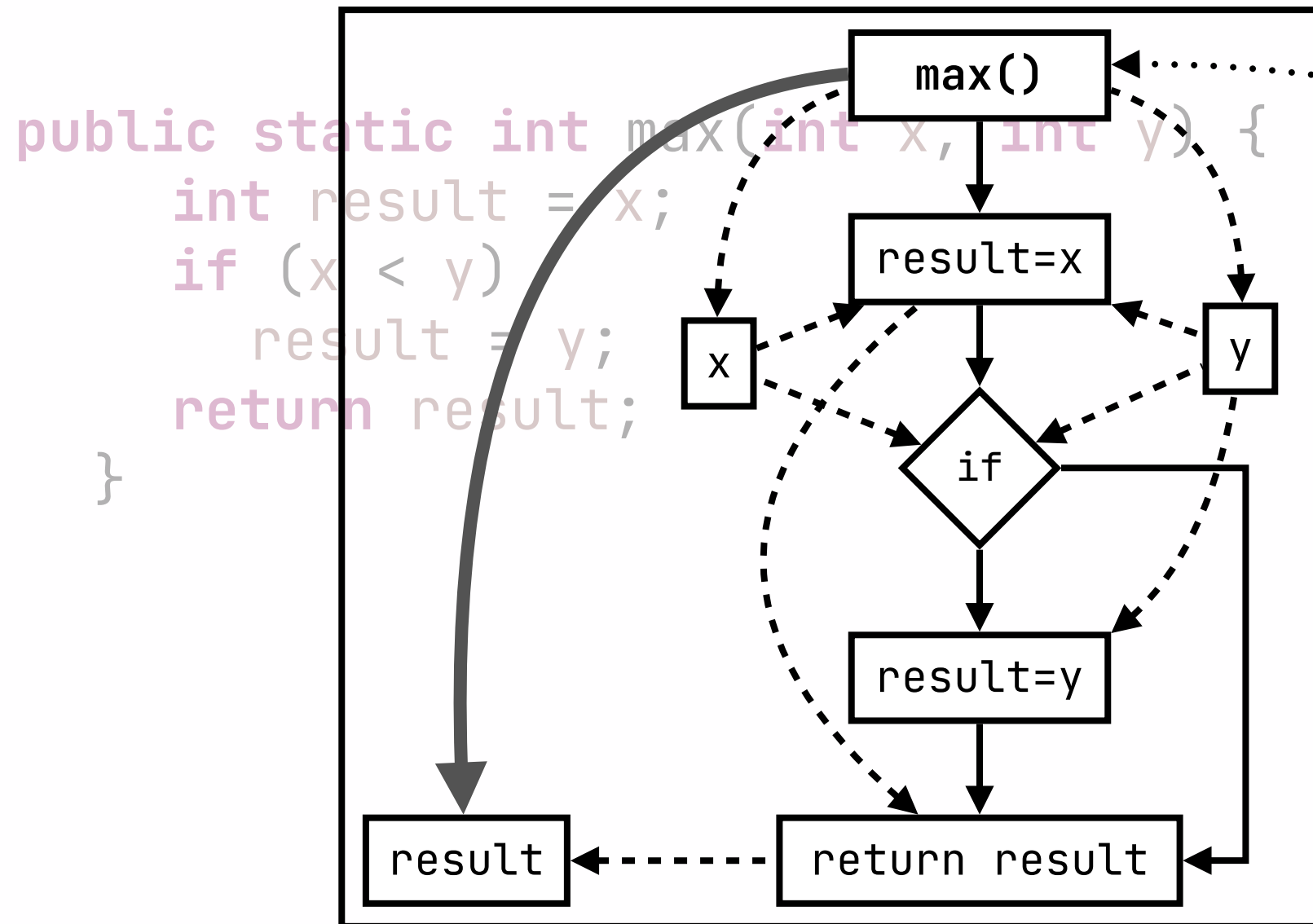ready result

Program Dependence Graph

```
public static int max(int x, int y) {
    int result = x;
    if (x < y)
        result = y;
    return result;
}
```
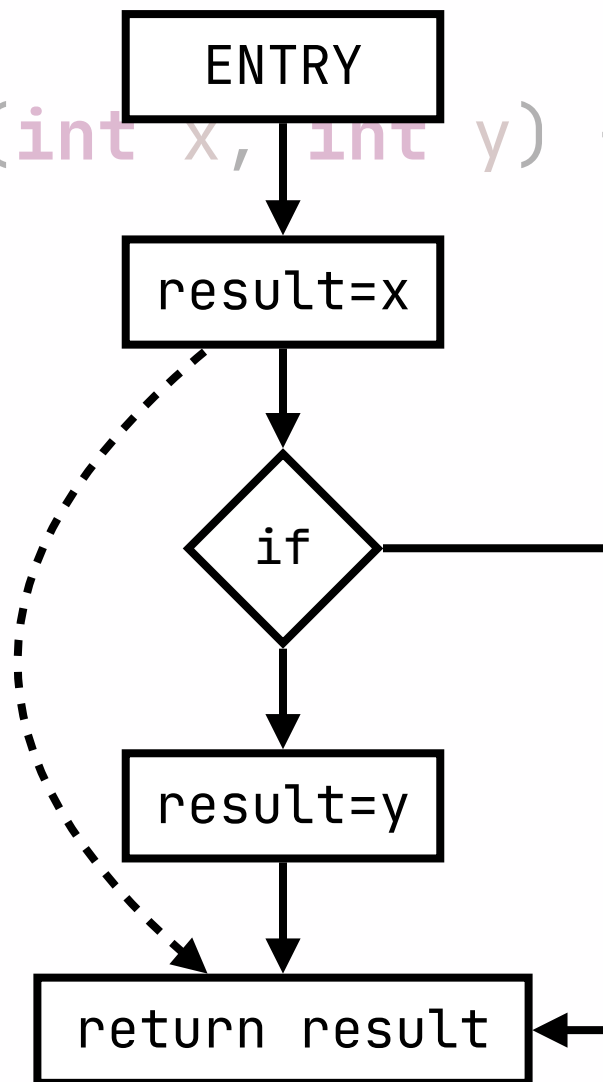
System Dependence Graph

Conclusion

- Data flow graph
  - expressions
- Control flow graph
  - statements
- System dependence graph
  - both + calls + summaries
- Related to Activity Diagrams
  - and State Machine Diagrams

Topics/Slides Disclaimer

- **Good** ✅
  - watch before Q&A
  - embrace reality
  - try out at labs
  - ask for feedback
  - apply to project
  - dig deeper
  - recall from slides

- **Bad** ❌
  - slides over videos
  - assumptions
  - blanks
  - timing

Unified Modeling Language

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