Ryax Training

From data lakes to data streams

Ph.D. Pedro Velho - Lead Software Engineer @ Ryax Technologies

Introduction

motivation

- Data flows from everywhere
  - Social media
  - Weather data
  - Traffic cameras
  - Demographic data

Introduction
motivation

"...organizations who implemented a Data Lake are outperforming similar companies by 9% in organic revenue growth.." source AWS: What is a data lake?

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  - Weather data
  - Traffic cameras
  - Demographic data

"...IoT data will make more than 95% of real-time data by 2025 ..." source IBM ebook: Build a better data lake

Introduction

motivation

- In the past data storage was a huge cost

Introduction

motivation

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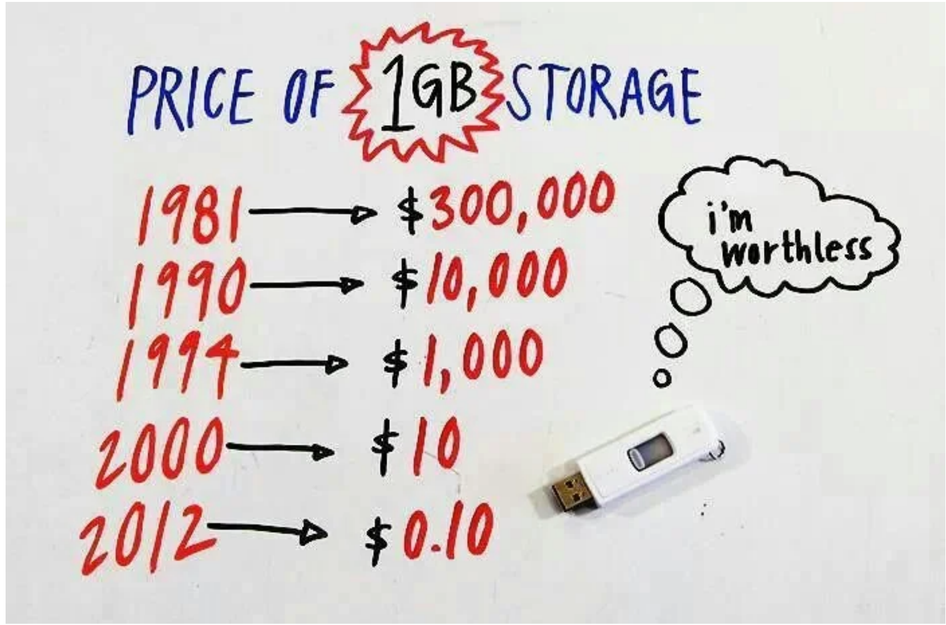

source : reddit post

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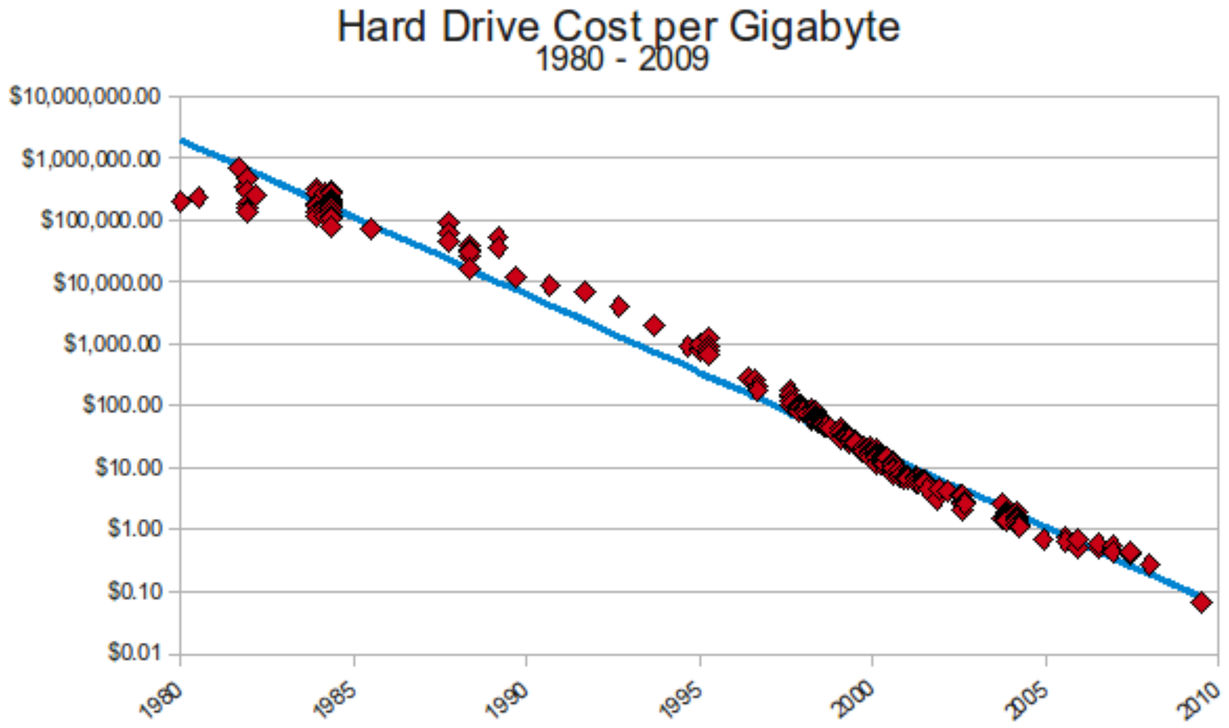
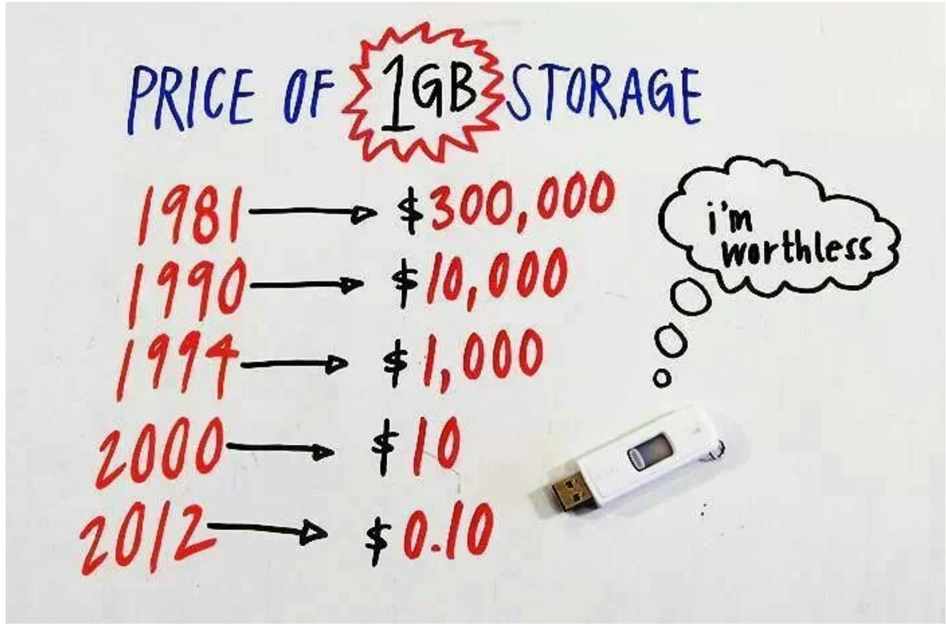


source : https://mkomo.com/cost-per-gigabyte



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Introduction

motivation

- In the past to store data was expensive
  - Only store data you use often and is valuable to your business
  - Access data through a well defined schema
- Now data is cheap
  - Store everything you can
  - Often no schema to explore data or cross reference

Introduction

motivation

- Data Warehouses
  - Only store well defined data that means something to your business
  - Structured data, well formed and with stablished relationship
  - Schema-on-write
- Data Lakes
  - Store data as is, a blob of bytes, many formats
  - Schema-on-read : use sophisticated algorithms to read and analyze data

Introduction

Ryax

- A platform for data teams
  - Help to design solutions with focus on data flow
  - Ease deployment on complex infrastructures
  - Makes it easy to plug data sources: API, object storage, SQL
  - Re-use to reduce boiler plate code

Introduction

Ryax

- Automate: multi-node, auto deploy, native error management, resilient to temporary failures
- Observe: monitor infrastructure, application's execution view from data perspective
- Evolve: integrate best dev practices (versioning, modularity, re-use), mutually grow towards new analytics (ML, AI), and infrastructure (cloud, data lake, edge)
- Low code: well defined framework to abstract tedious and boiler plate code, convert ad hoc solution hold by a single individual into company culture

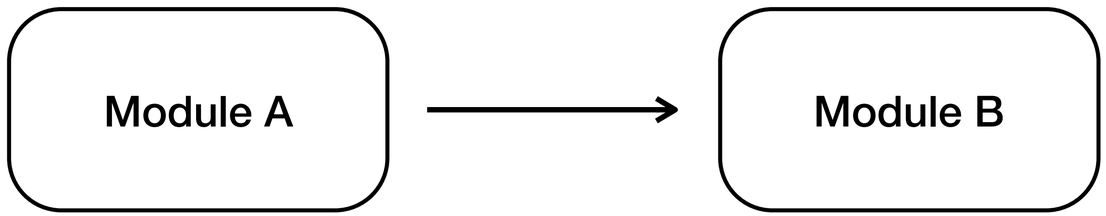
Concepts

introduction

- Workflows
- Modules
  - Sources
  - Processors
  - Publishers
  - Stream operators

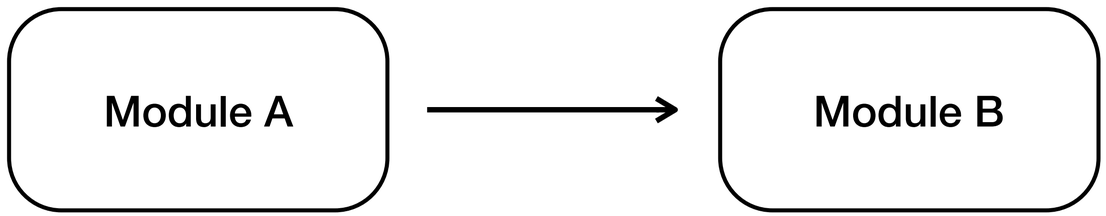
Concepts

workflows



Concepts

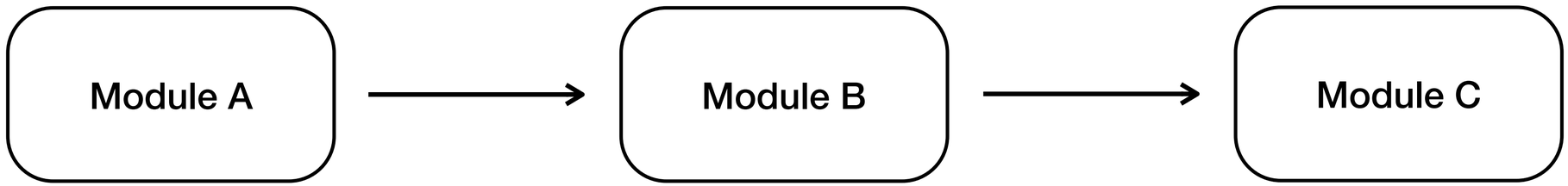
workflows



The arrow means A feed B with data

Concepts

workflows



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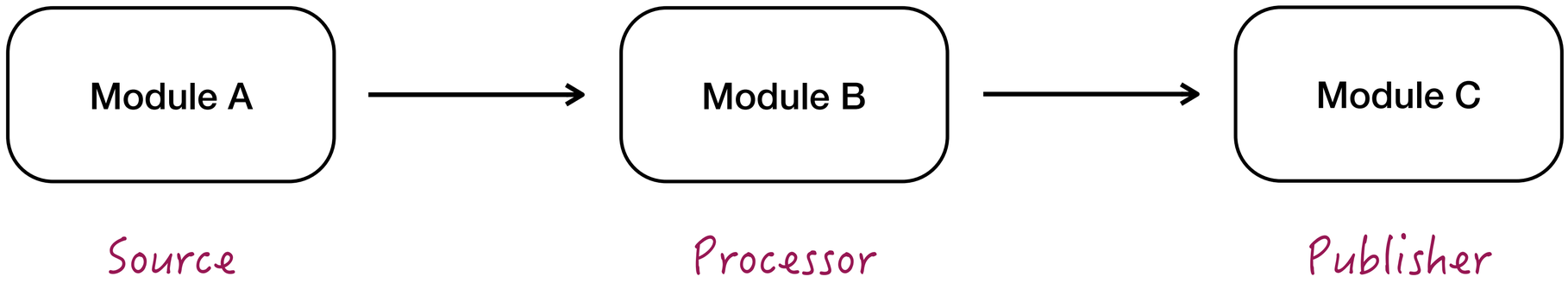

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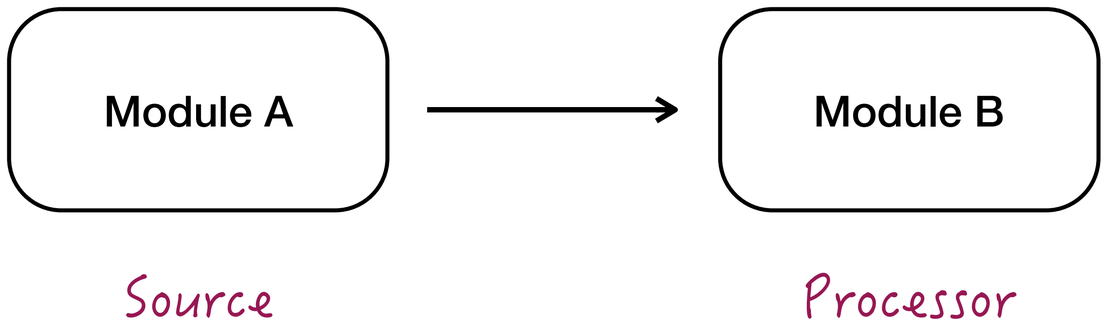
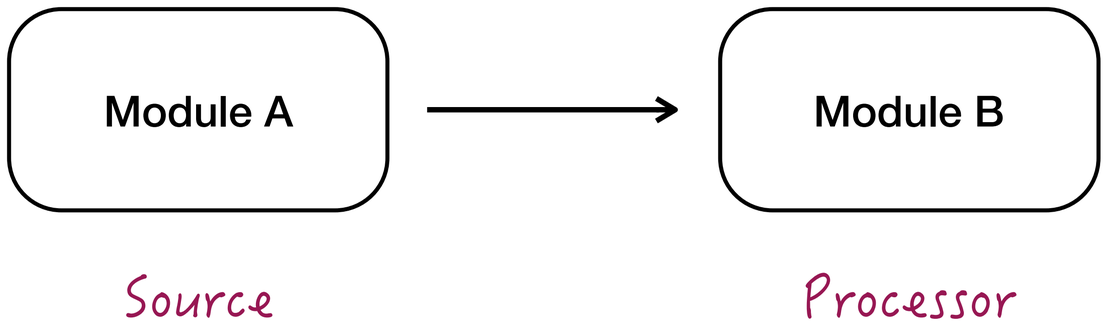


Concepts

workflows

New data arrives: 1



Concepts

workflows

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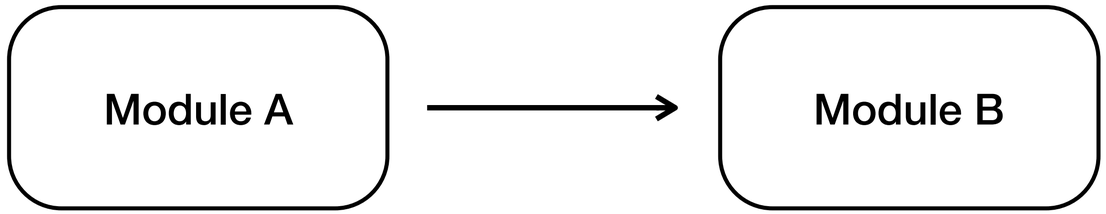


Source

Processor

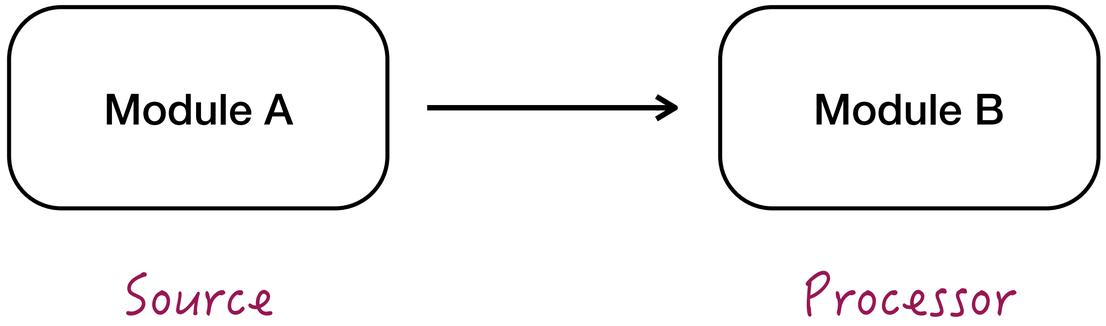
Guarantees that A will process 1 before B process 1

Concepts

workflows

New data arrives: 1

New data arrives: 2



Concepts

workflows

New data arrives: 1

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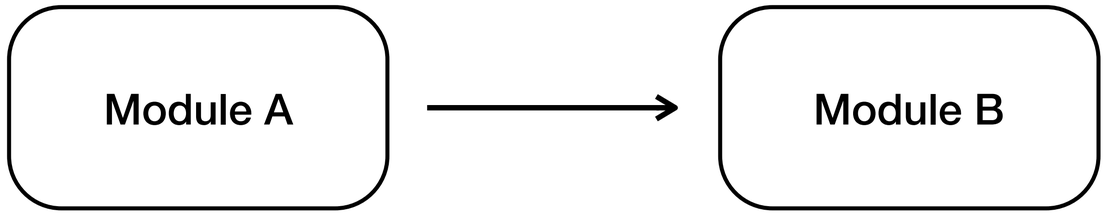


Source

Processor

Guarantees that A will process data before B, but order is not granted

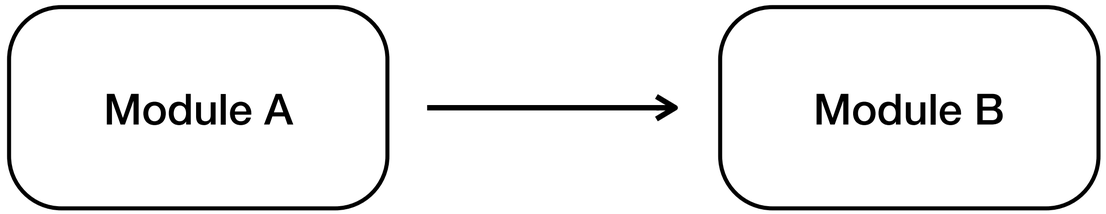
A1, B1, A2, B2

Concepts

workflows

New data arrives: 1

New data arrives: 2



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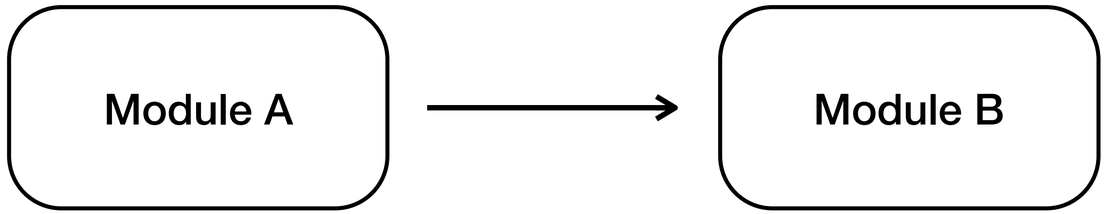

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Concepts

workflows

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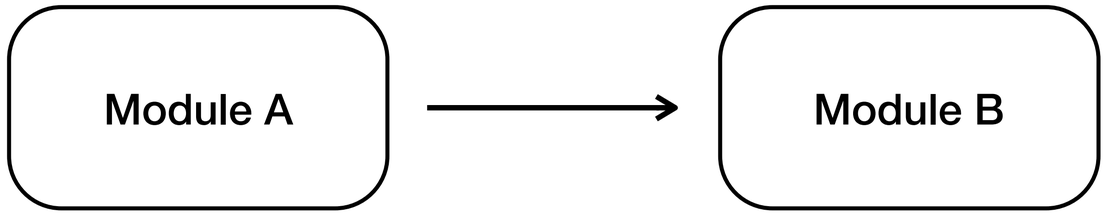


Source

Processor

Guarantees that A will process data before B, but order is not granted

A1, B1, A2, B2

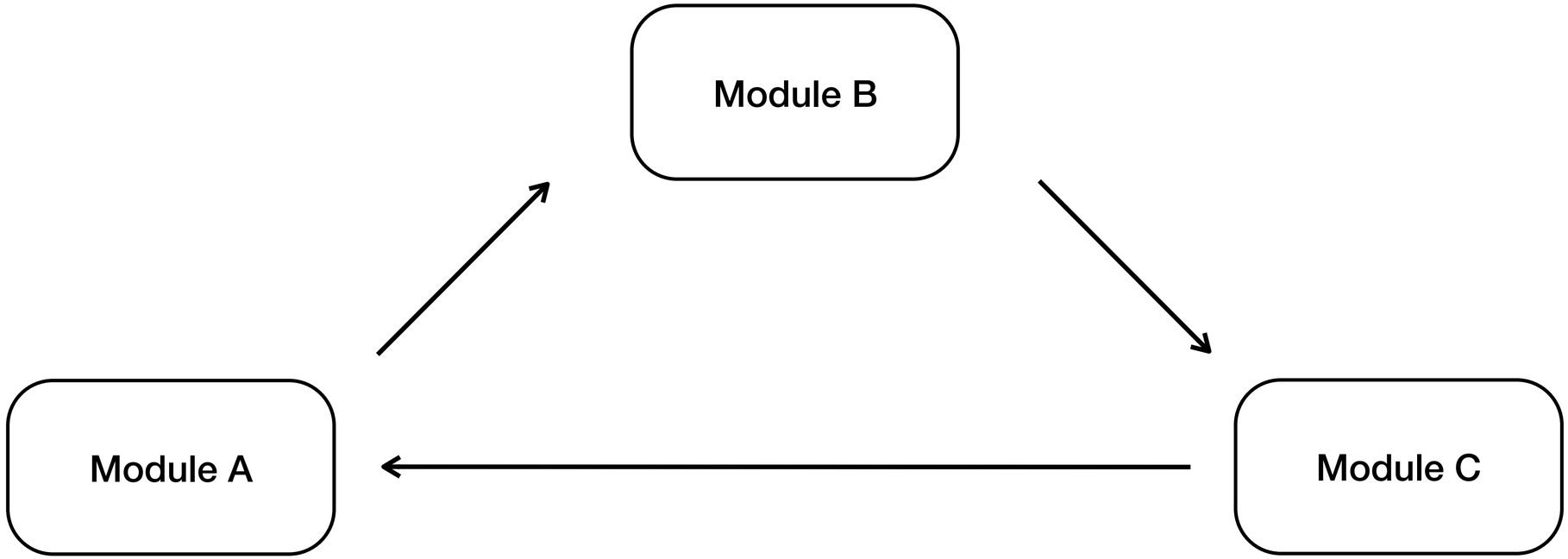
A1, A2, B1, B2

A1, B2, A2, B1

B2 must execute after A2

Concepts

workflows



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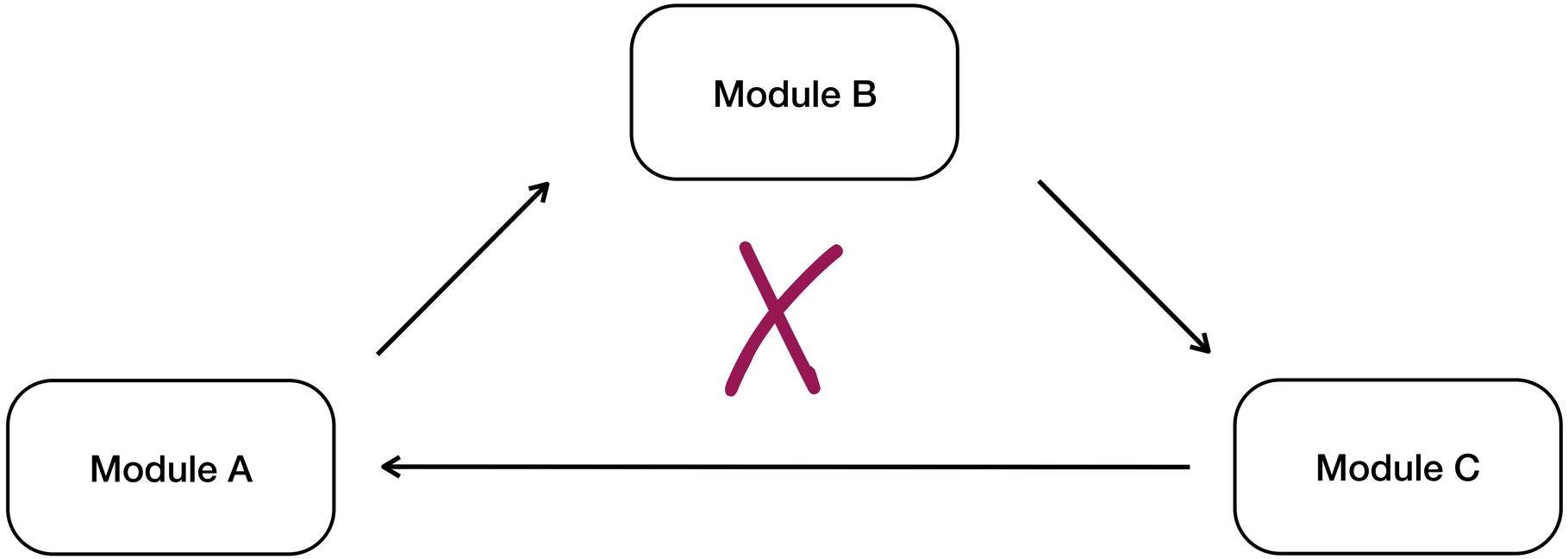
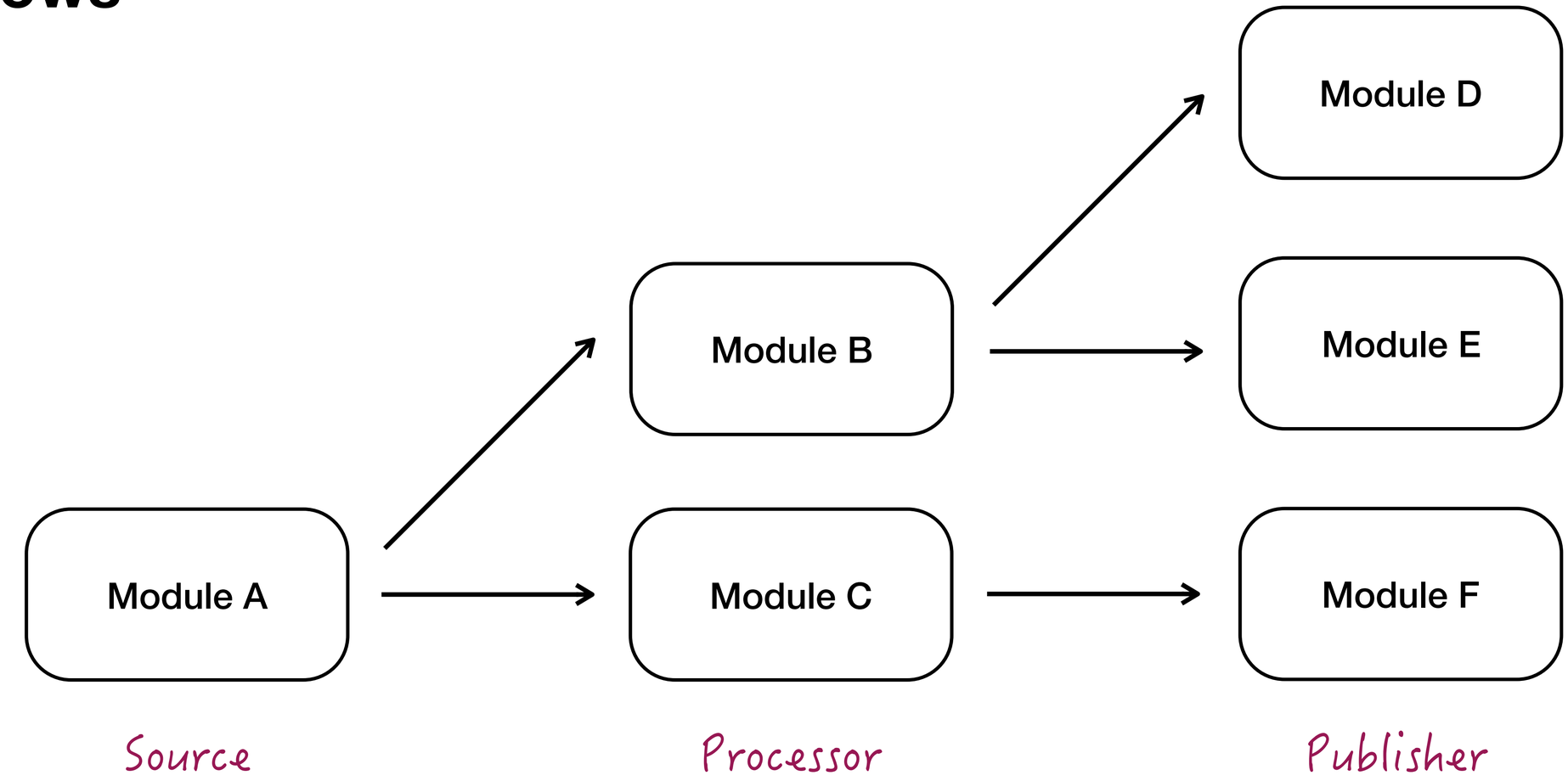


Cycles are not allowed

Concepts

workflows



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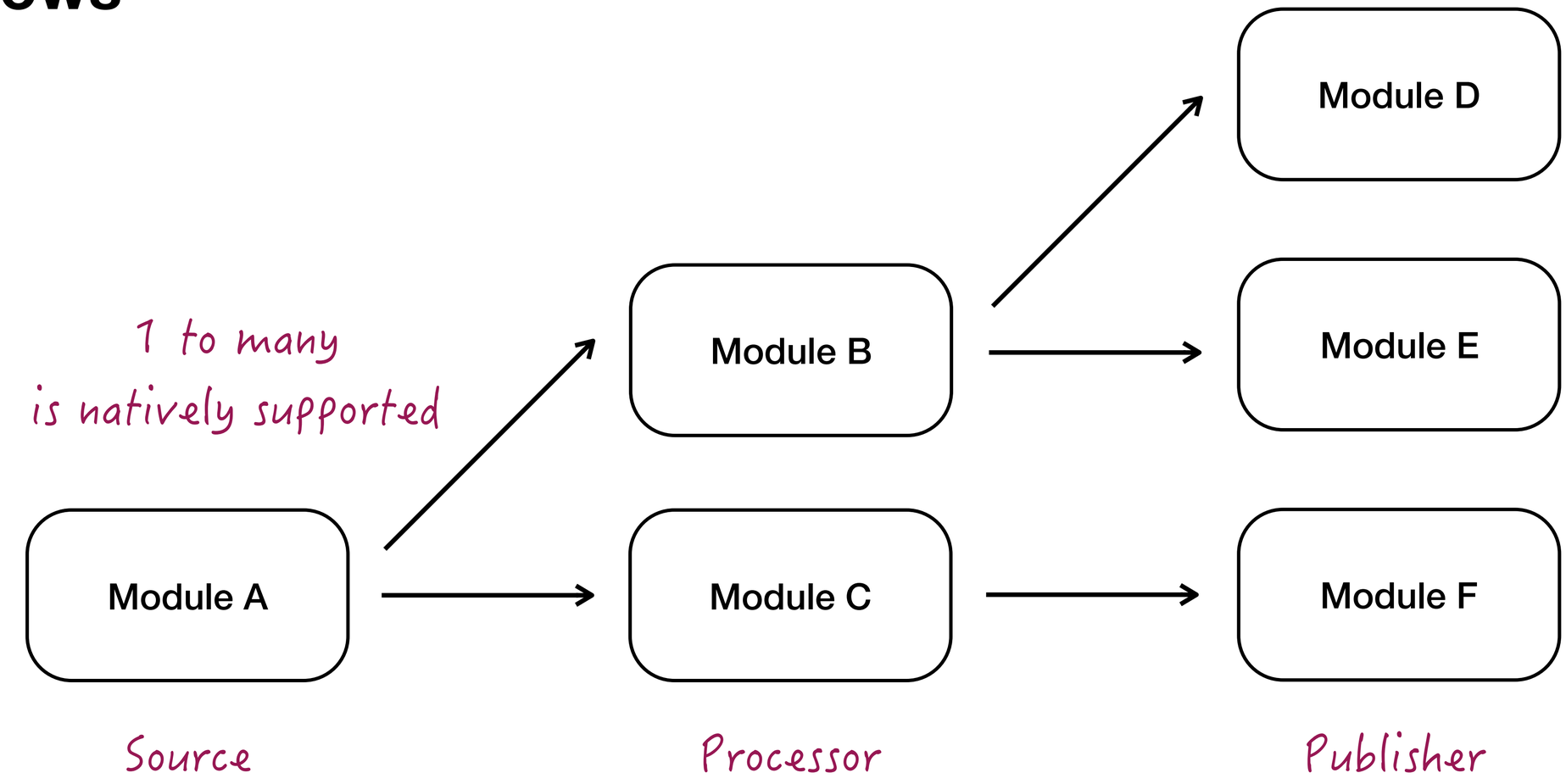

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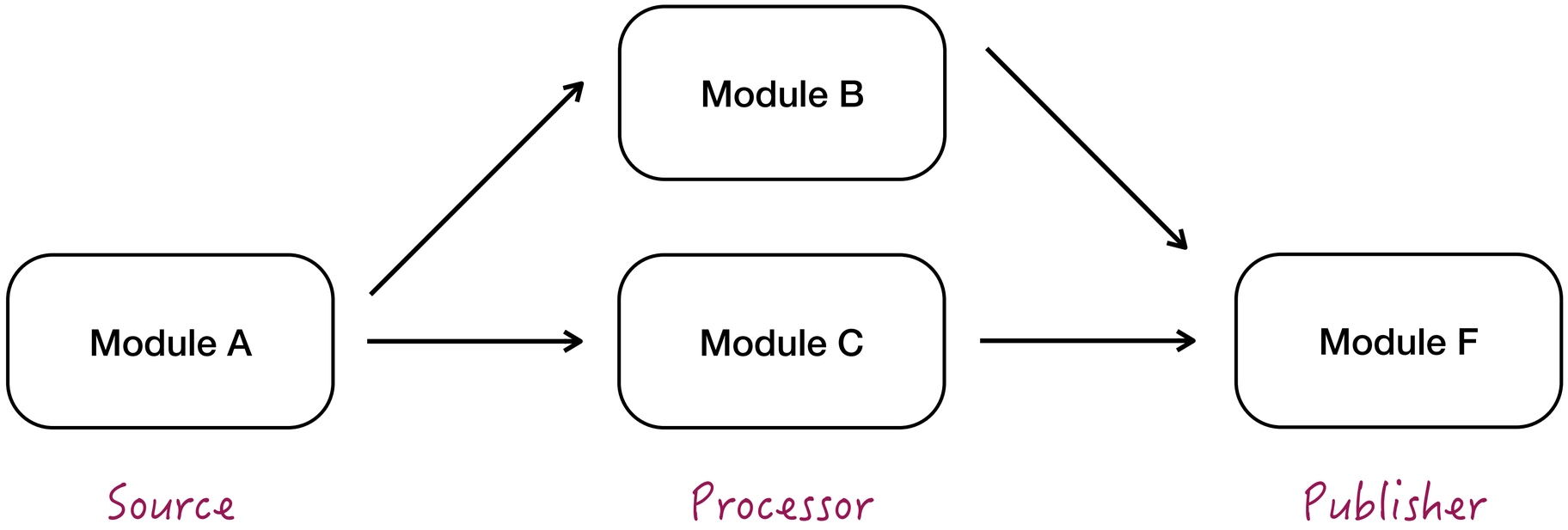

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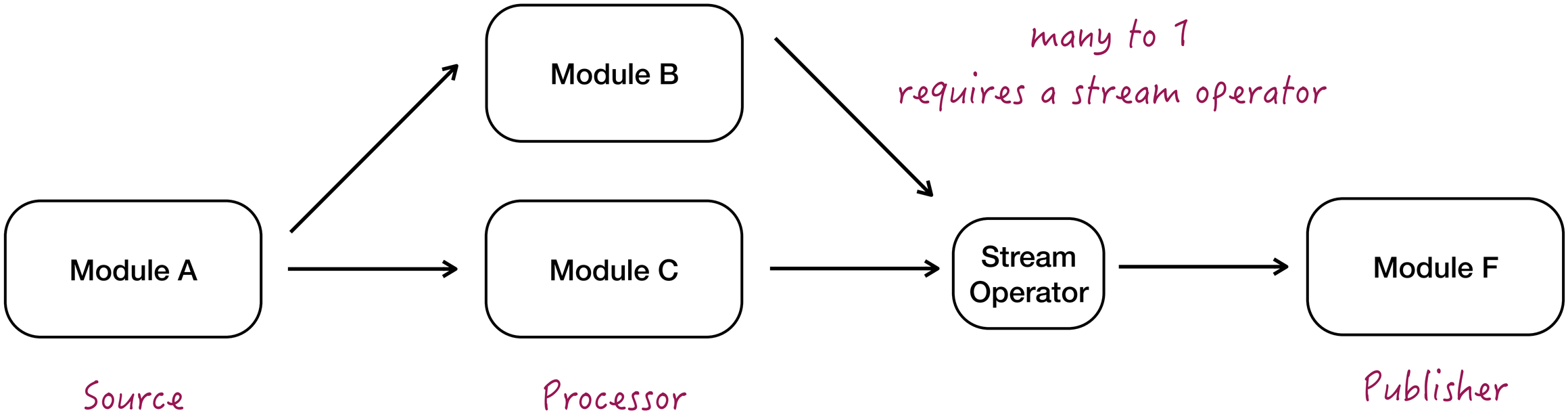
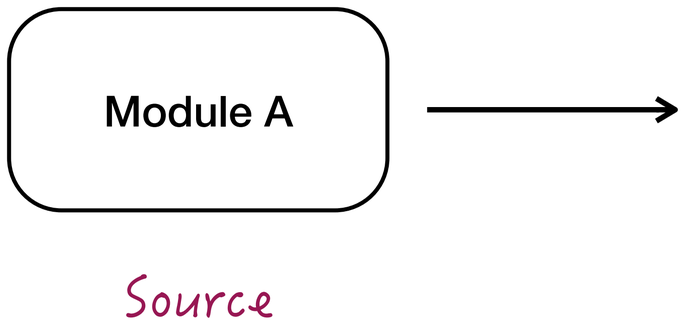


Concepts

sources



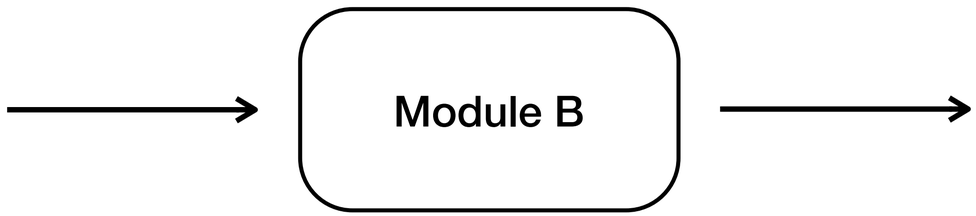
Concepts

sources

- Python3 module to inject external data into Ryax application
- Generate executions each time a new event arrives
- Propagate execution to directly connected modules
- Examples:
  - Retrieve information periodically from external data lake
  - Listen to API requests

Concepts

processors



Processor

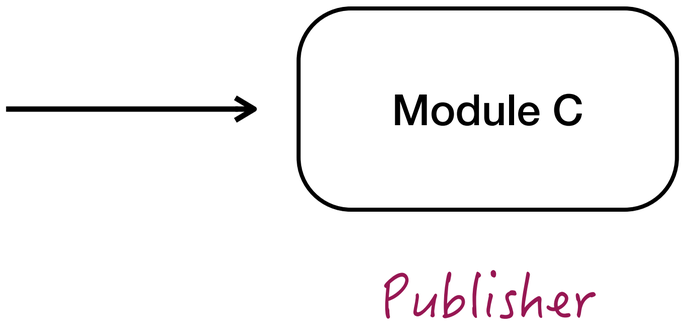
Concepts

processors

- Modules that **do the actual computing**
- Python3 modules with dependencies
- Other dependencies can be installed using nix expression
- Examples:
  - Compute analytical model
  - Use tensorflow for ML or AI
  - Aggregate results

Concepts

publishers



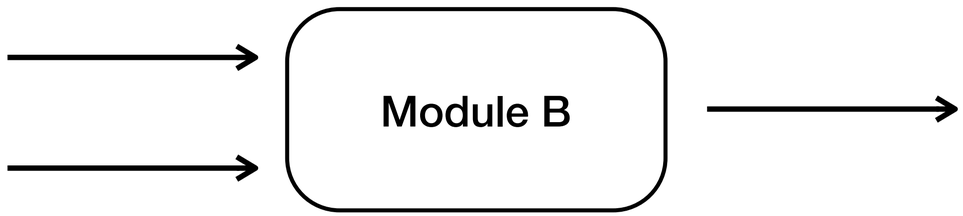
Concepts

publishers

- Python3 module to export results
- Several providers supported: AWS S3, GoogleCloud Storage, Minio
- Examples:
  - Send an e-mail
  - Export file to S3
  - Export blob of data to datalake

Concepts

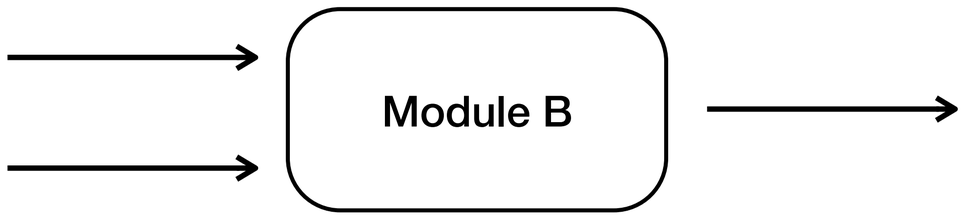
stream operators



Stream Operator

Concepts

stream operators



Stream Operator

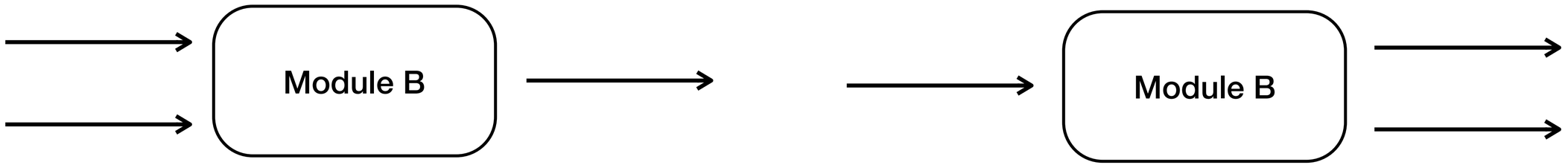
many to 1

select or combine data

enable multiple sources

Concepts

stream operators

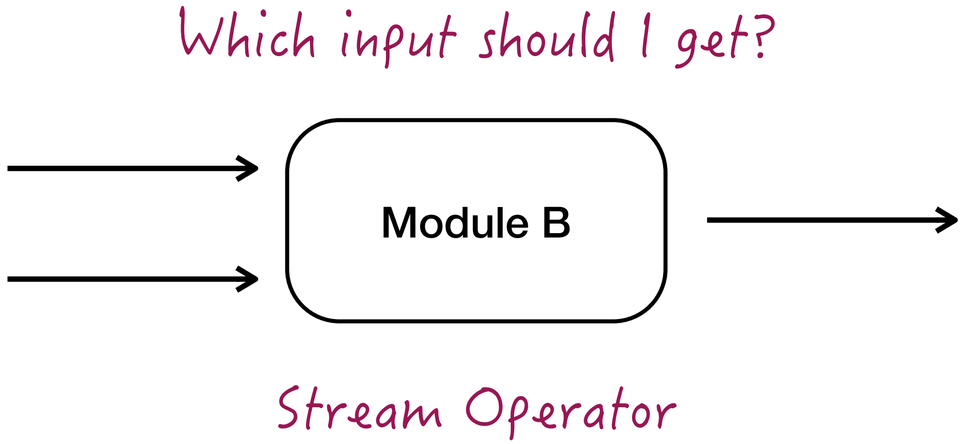


many to 1

1 to many

Concepts

stream operators



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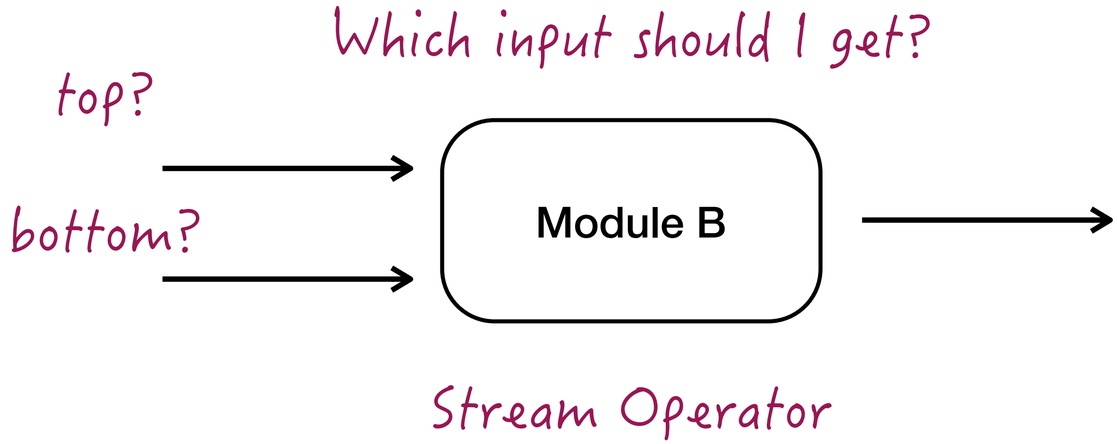

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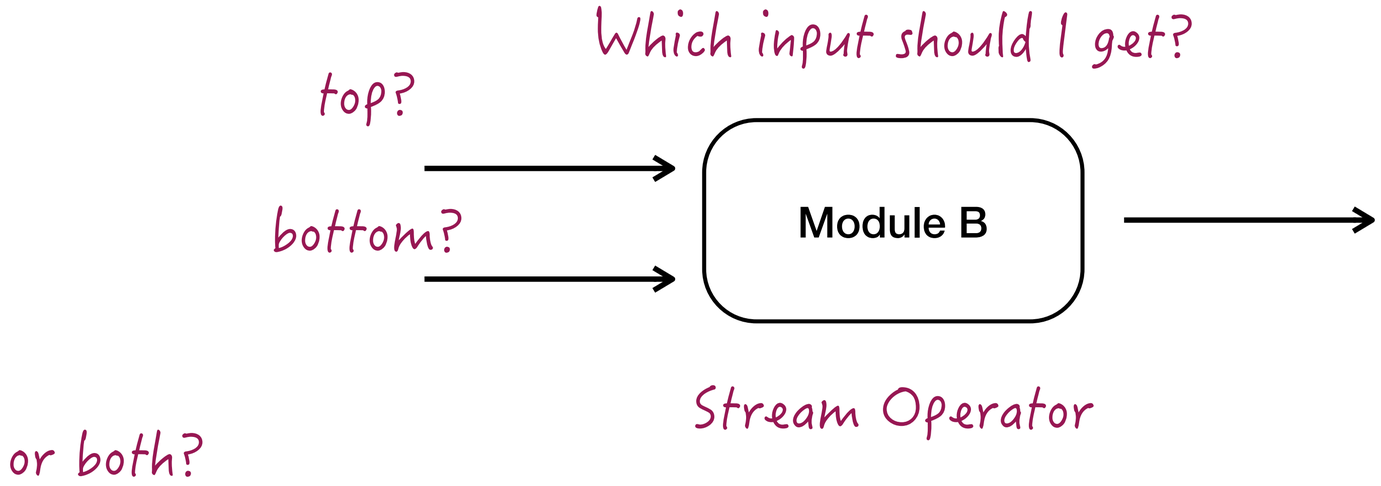

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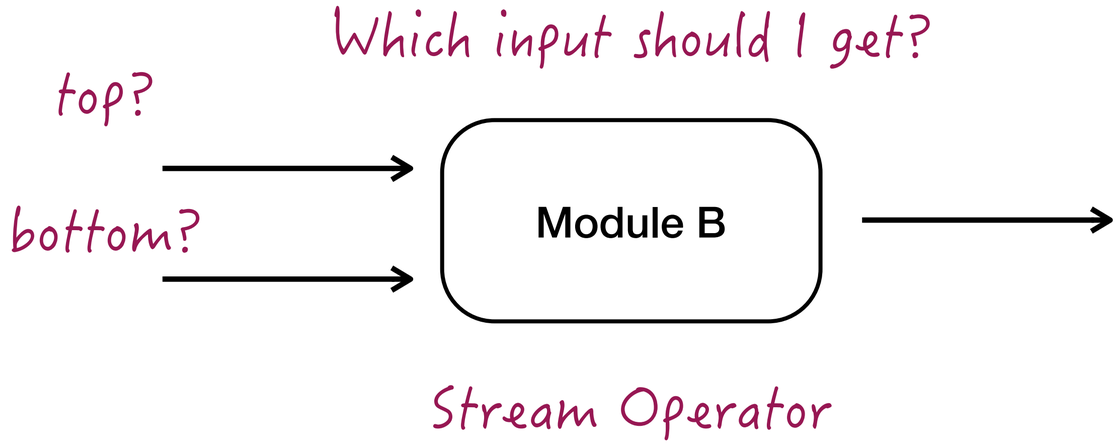

Concepts

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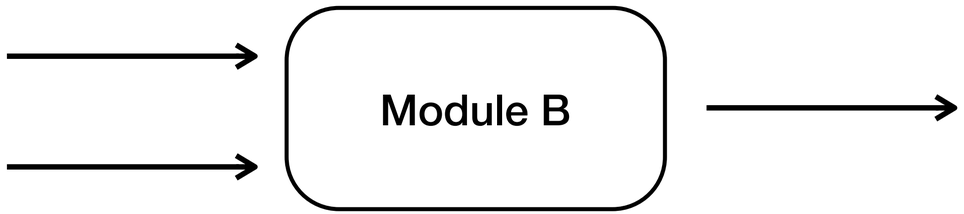
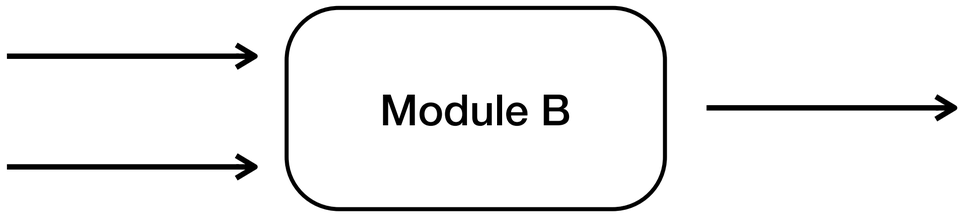
- For instance **withlatestfrom:**



Concepts

stream operators

- For instance **withlatestfrom:**
  - Wait for both events to arrive E_1 and E_2



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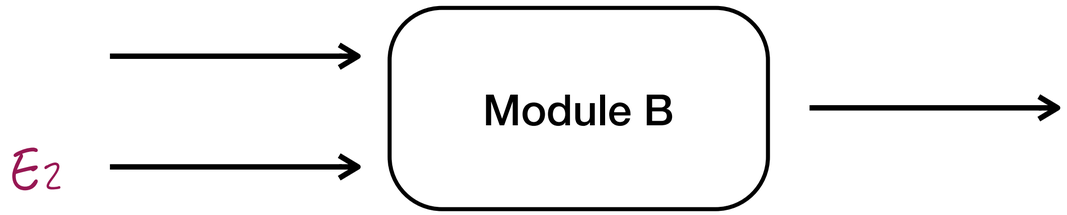

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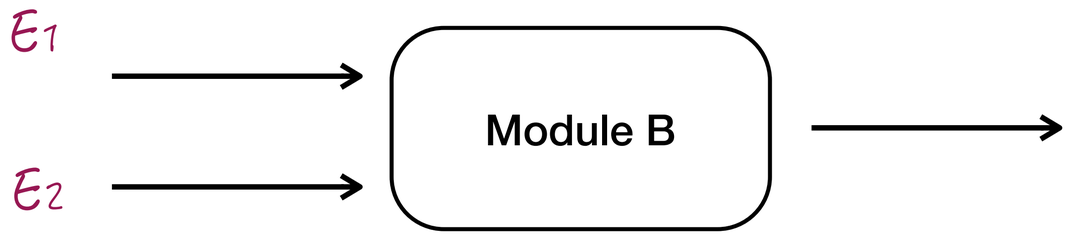

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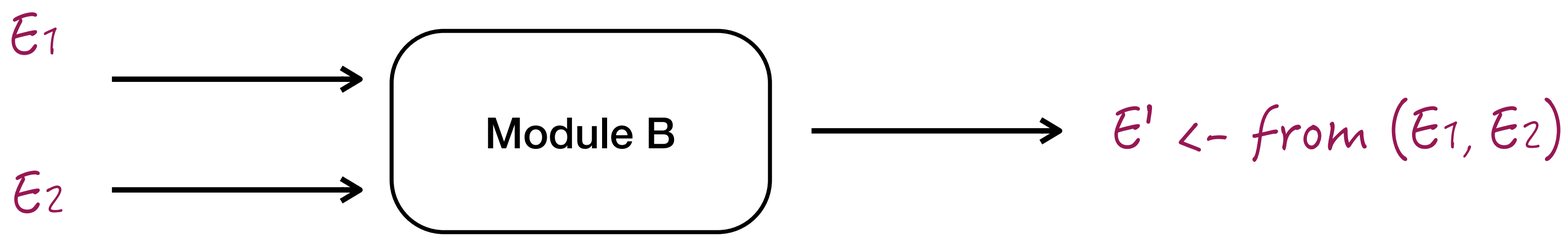

Concepts

stream operators

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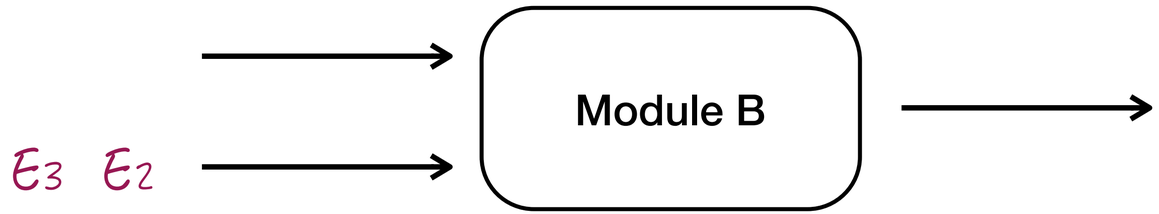
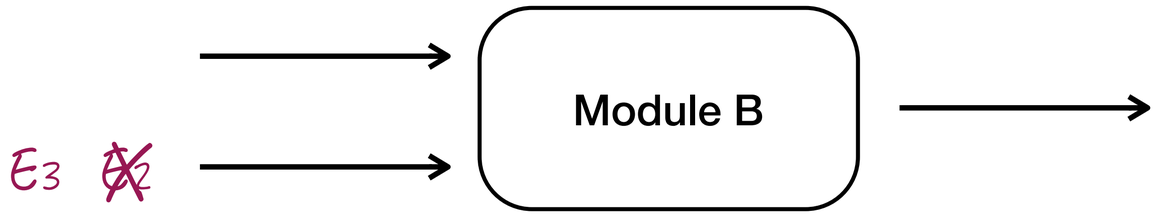
  - If a new event E_3 arrives before E_1, replace with latest



Concepts

stream operators

- For instance **withlatestfrom:**
  - Wait for both events to arrive E_1 and E_2
  - If a new event E_3 arrives before E_1, i.e. E_2 is lost



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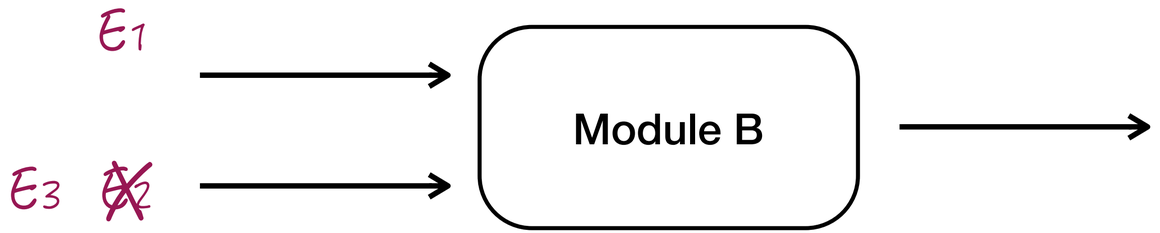

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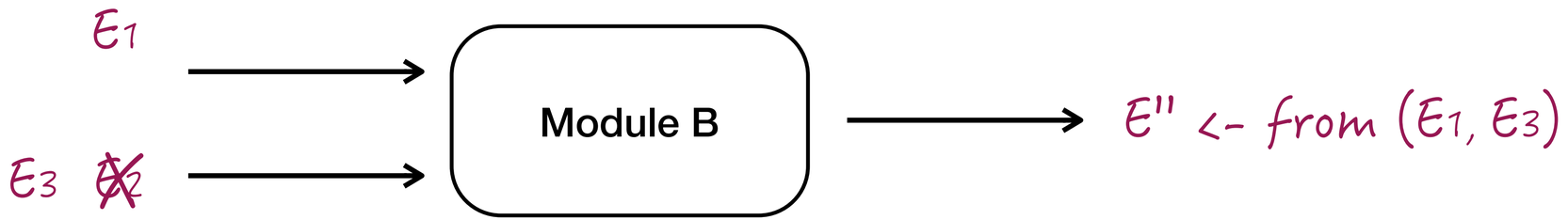

Executions

introduction

- Data generate events that generate data
- Events change the status of deployed modules: submitted, running, ran, done
- Executions show detailed information on data and module reactions
- Can easily track which data produced which result
- Show logs for produced results