

Micro-Services

Node Training



Micro-Services

- Introduction
- Pattern Matching
- Message Transport
- Practical Design

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- Message Transport
- Practical Design

What are Micro-Services?

“A software component that one developer can rewrite, correctly, in one week.”

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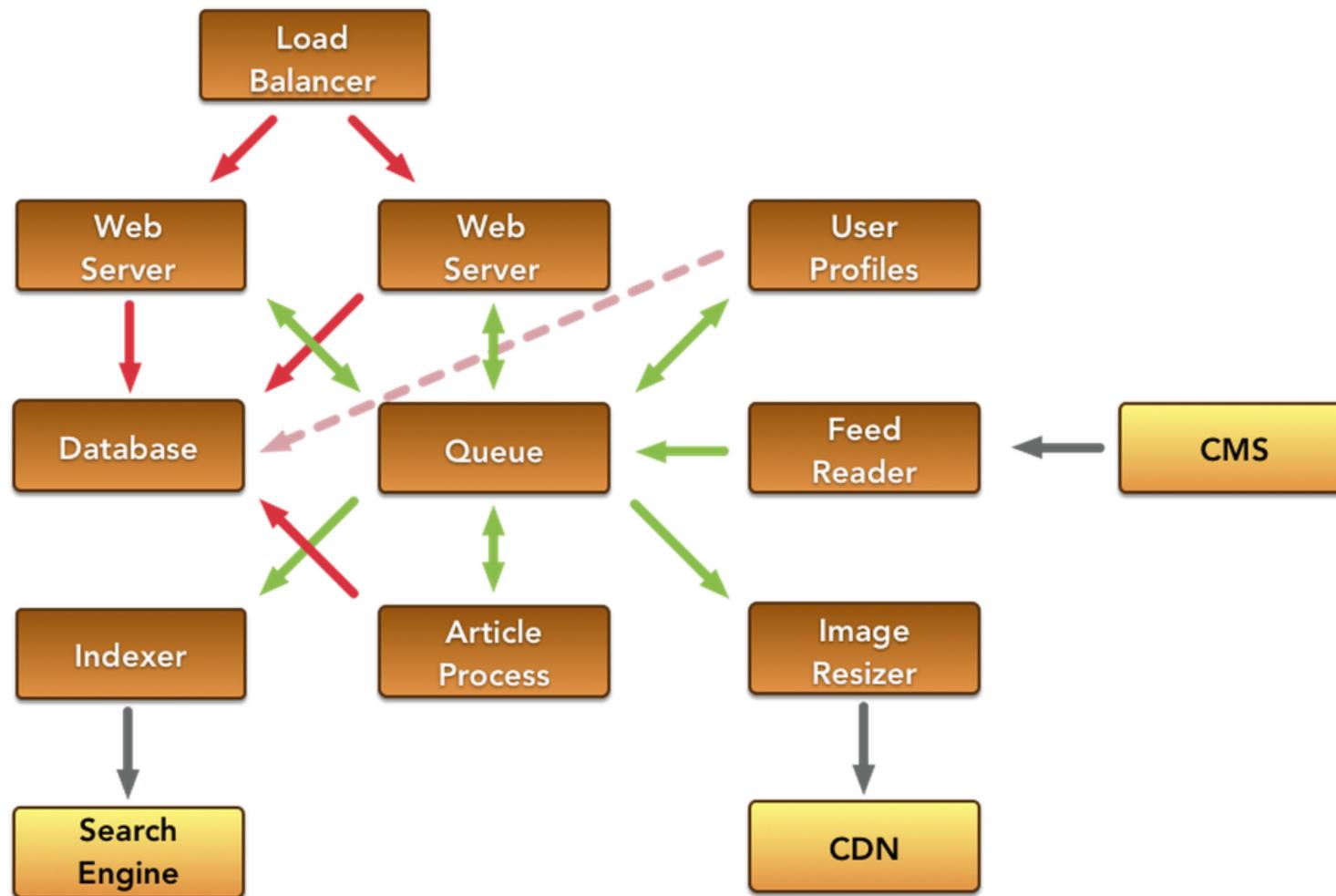
- Developers can work independently, and deploy continuously
- Break your system into small autonomous pieces
- They are small, very small
- They are disposable
- They communicate via messages, over dumb pipes
- They expect failure, complain loudly, and restart

How we "discovered" them

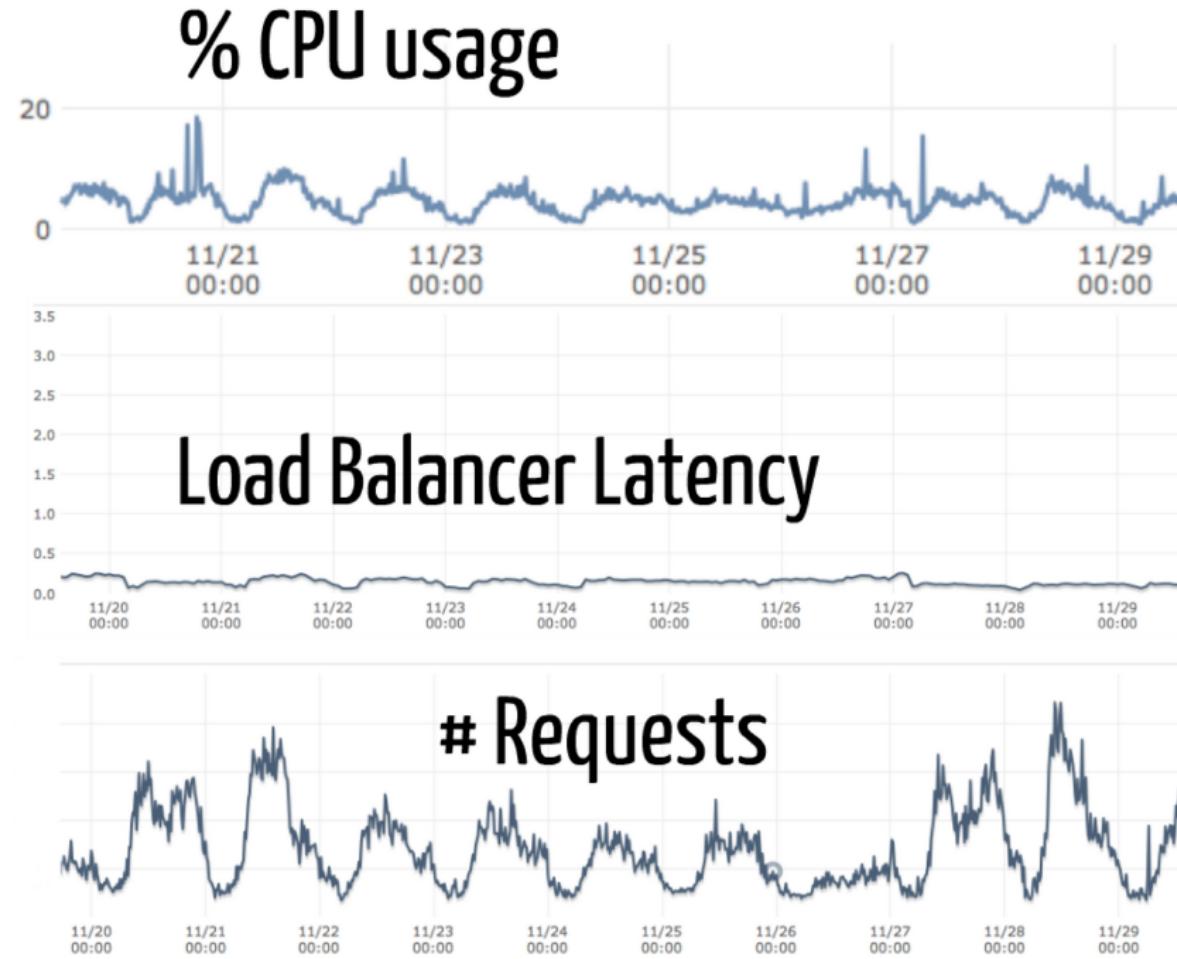


The Sunday Business Post

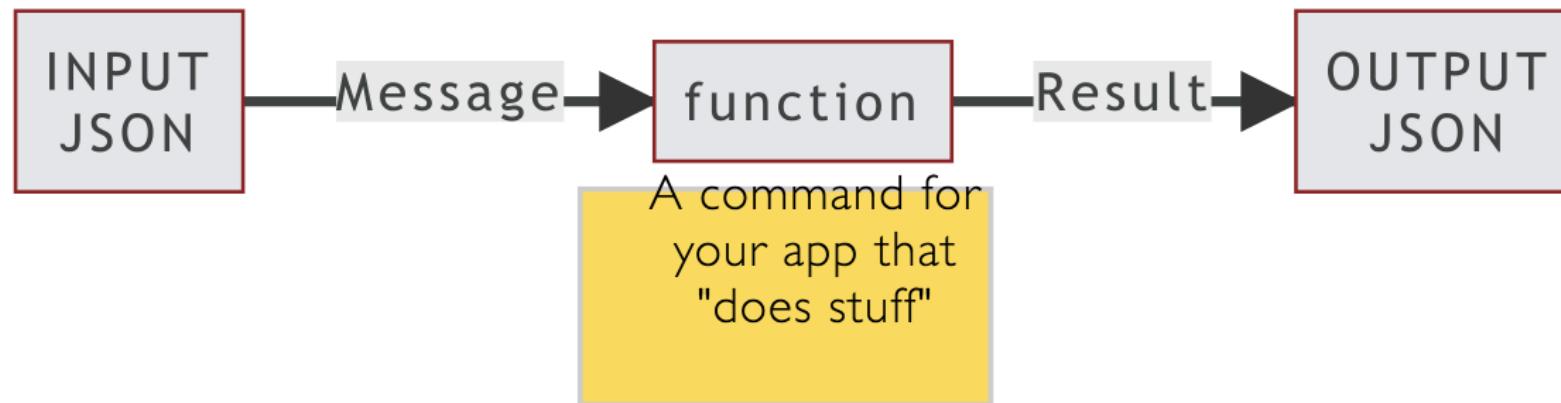
Service Architecture - an Accident!



System Performance



Basic Pattern



Messages are just JSON

- "Send Tweet"
- Acted on by Tweet Service

```
{  
  command: "tweet"  
  author: "@rjrodger"  
  status: "Hello!"  
}
```

Match the Pattern

- There's a Tweet Service
- Observes messages
- Matches:

```
command: "tweet"
```

Patterns give Flexibility

- Start with one, general service
- Customers add new requirements over time
- Specialize into new services
 - but retain the general case

Real world: Sales Tax



New York State
Department of
Taxation and Finance

Sales and Use Tax Rates On Clothing and Footwear

Effective February 1, 2014

Publication 718-C

(1/14)

Clothing, footwear, and items used to make or repair exempt clothing sold for less than \$110 per item or pair are exempt from the New York State 4% sales tax, the local tax in those localities that provide the exemption, and the $\frac{3}{8}\%$ Metropolitan Commuter Transportation District (MCTD) tax within the exempt localities in the MCTD.

The MCTD consists of the city of New York and the counties of Dutchess, Nassau, Orange, Putnam, Rockland, Suffolk, and Westchester.

The exemption applies only to clothing and footwear worn by humans. It also applies to most fabric, thread, yarn, buttons, snaps, hooks, zippers, and similar items that become a physical component part of exempt clothing, or that are used to make or repair exempt clothing.

The following are not eligible for exemption:

- Clothing and footwear that sold for \$110 or more per item or pair.

- Costumes or rented formal wear.
- Items made from pearls, precious or semi-precious stones, jewels, or metals, or imitations thereof, that are used to make or repair clothing eligible for exemption.
- Athletic equipment.
- Protective devices, such as motorcycle helmets.

For a detailed list of exempt and taxable items, see TSB-M-06(6)S, *Year-Round Sales and Use Tax Exemption of Clothing, Footwear, and Items Used to Make or Repair Exempt Clothing (Effective April 1, 2006)*.

Use this publication to determine the applicable sales tax rates in each county and city that imposes sales tax.

Any items changed from the previous version are noted in ***boldface italics***.

Node.js Micro-Services

- <http://senecaajs.org>
 - Provides a framework for building micro-services
 - Let's you focus on:
 - message patterns
 - service logic
 - Allows you to:
 - compose services
 - easily configure message transportation
 - Write everything as if it runs in one process



How Seneca Works

- Functions that act on Messages
 - You get some JSON input
 - Some of its properties matched your pattern
 - You do your thing
- Optionally, send some JSON back
 - (request with optional response model)

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Sales Tax: sales-tax0.js

```
$ node sales-tax0.js
```

- Define a pattern:
 - cmd: "salestax"
- Perform an action
 - calculate total from net and rate
 - net is an argument
 - rate is configuration
 - { cmd: "salestax", net: 100 }

Sales Tax: sales-tax1.js

```
$ node sales-tax1.js
```

- Use pattern matching
 - General case
 - apply if we don't recognise country
 - Individual countries
 - use a country property

Sales Tax: sales-tax2.js

```
$ node sales-tax2.js
```

- Some countries have special data
 - US has state taxes
 - pattern match a state property

Sales Tax: sales-tax3.js

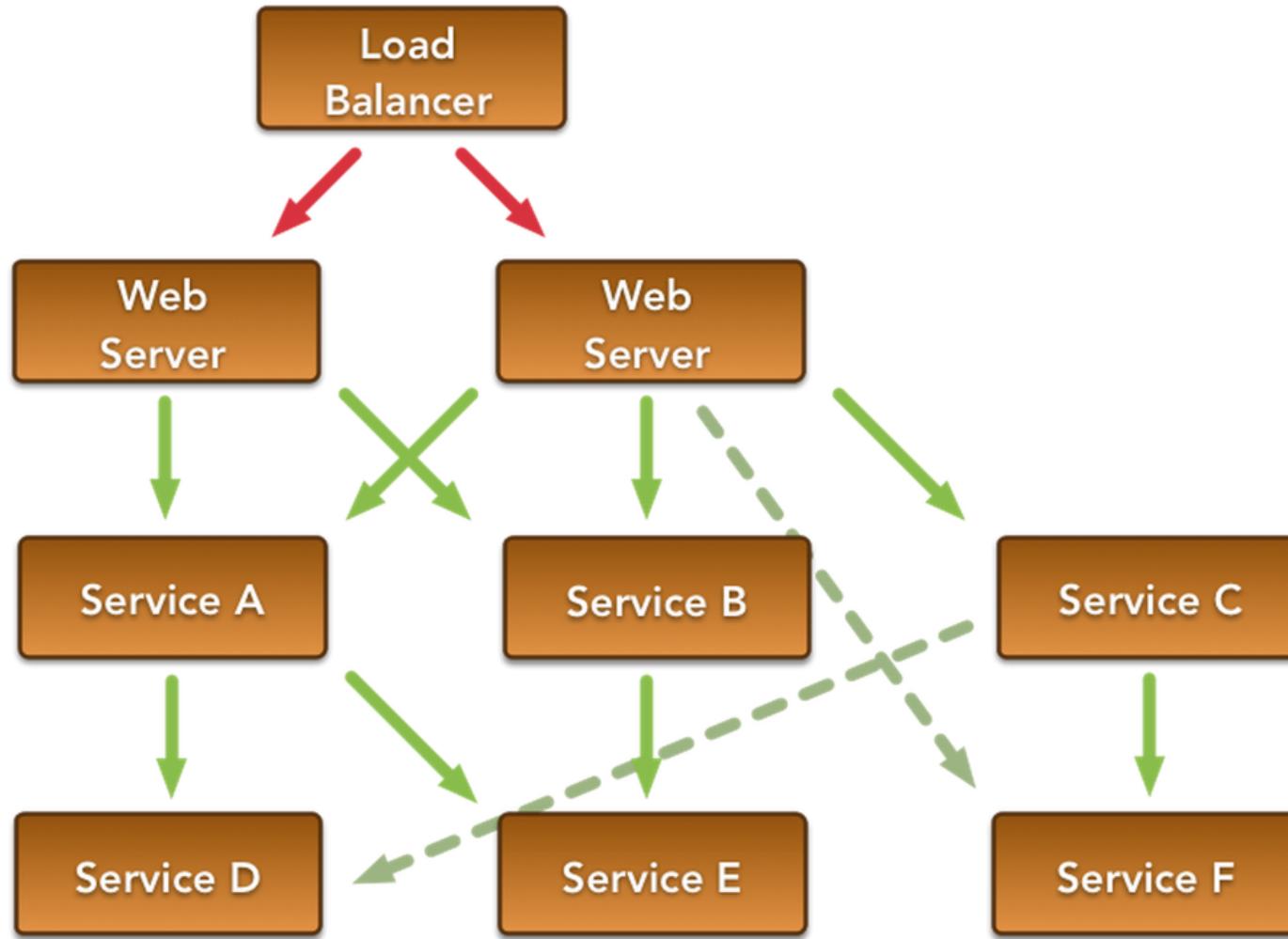
```
$ node sales-tax3.js
```

- Some states have special rules!
 - Montgomery, AL has higher sales tax
 - use a city property
 - Some New York counties exempt cheaper items of clothing
 - break into code at this point

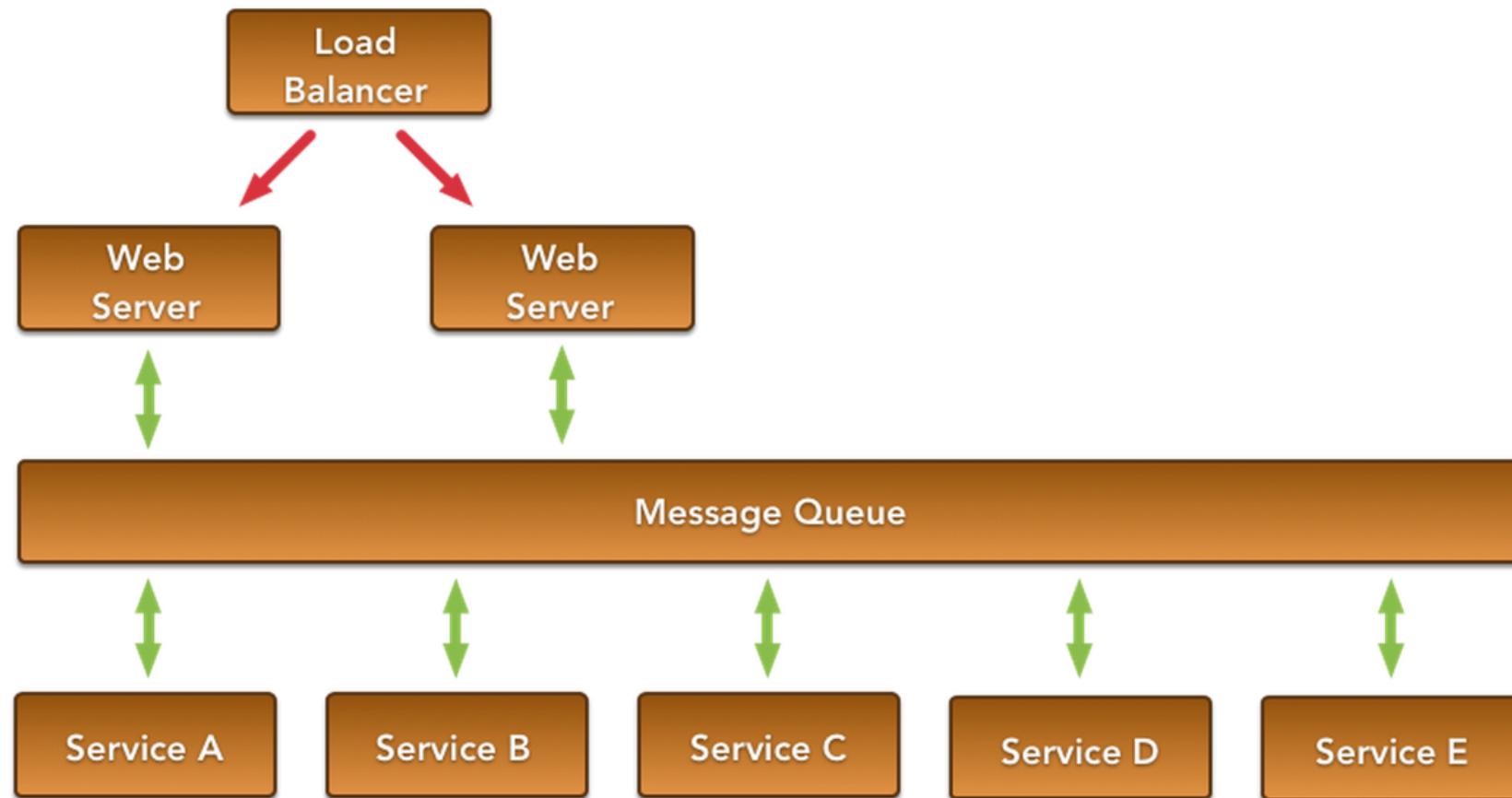
Message Transport

- In one sense, it doesn't matter
 - Developers should assume system is completely asynchronous
 - ... and every action is in its own service
- This means you can reconfigure as you grow

Fan-Out Architecture



Message Queue Architecture



In Process, Direct

- In Process
 - mostly for development
 - also works for low volume services
- Direct
 - use HTTP
 - use load balancers to scale

PubSub, Queues

- PubSub.
 - messages generate multiple actions
 - senders know nothing
 - publish interesting stuff
 - you can get quite far with Redis
- Message Queues
 - Needed for scale
 - but beanstalkd is fine for local dev
 - Choose wisely - you need high throughput
 - We like Apache Kafka

Two Examples

- An MVP, with two instances behind a load balancer. In-Process, and Direct transports will take you quite far as you scale up.
- Booking engine with 100 queries per second, and 100 000 000 bookings per year. You'll need PubSub and Queues.

Sales Tax: sales-tax4.js

```
$ node sales-tax4.js
```

- Define a plugin
 - provides a definition of the service API
 - allows you to define services later

PubSub over Redis

```
$ node sales-tax-service-pubsub.js
```

```
$ node sales-tax-service-pubsub.js
```

```
$ node sales-tax-client-pubsub.js
```

- When you want many services
 - and the ability to add them easily
 - but operations are idempotent
 - or client can safely ignore duplicate responses

PubSub over Redis

```
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$ node sales-tax-client-pubsub.js
```

- When you want many services
 - and the ability to add them easily
 - but operations are idempotent
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Queues over Beanstalkd

```
$ node sales-tax-service-queue.js
```

```
$ node sales-tax-service-queue.js
```

```
$ node sales-tax-client-queue.js
```

- When you want many services
 - but each should handle separate messages
 - and you're going to need scale

Designing Micro Services

nodezoo.com



This is a search engine for [Node.js](#) modules.

ldap

 **ldap-sj 0.0.4**
2 years ago (created 2 years ago)
dreamlab
LDAP Binding for node.js

[github](#) [npm](#)

 **tw-node-ldap 0.0.4**
2 years ago (created 2 years ago)
pawawat
LDAP Binding for node.js

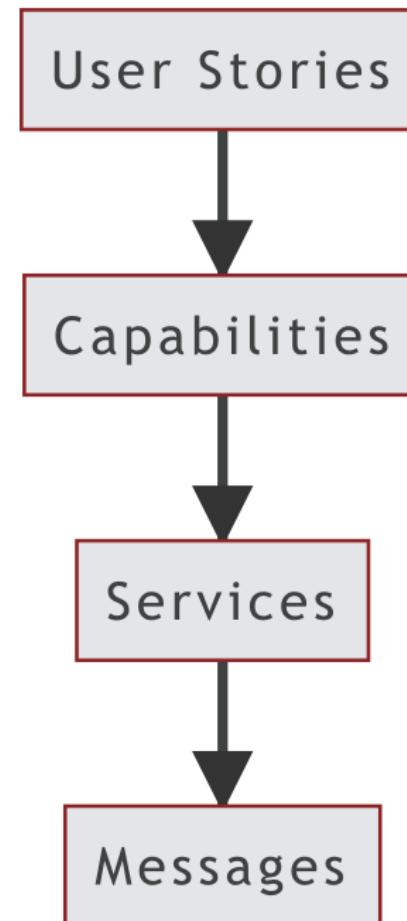
[github](#) [npm](#)

 **LDAP 1.2.0**
a month ago (created 2 years ago)
jeremycx
LDAP Binding for node.js

[github](#) [npm](#)



Simple Analytical Approach



User Stories (YMMV)

- autocomplete query
- perform search
- view info page
- rank modules
- update with new modules
- get metadata from github etc.

Capability Breakdown

Search
Engine

Module
Store

Meta
Data

Service Breakdown

Search Engine

Module Store

Meta Data

auto-
complete

info

request

search

update

Message Breakdown

In	Out
auto-complete: list	
auto-complete: add	
search: query	auto-complete: add
search: index	auto-complete: add
search: rank	
update: notify	search: index
	request: request
request: request	info: set
info: set	
info: get	