



[infoxchange]
Technology for social justice.

Search: A Journey of Delivery on a Budget

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Ricky Cook [Web Development]

ixa.io | infoxchange.net.au

WHO IS @INFOXCHANGE?

Infoxchange is a not-for-profit community organisation that delivers technology for social justice.

We work to strengthen communities and organisations, using information technology as the primary tool to create positive social change.

Web Applications
IT Efficiency Consulting
Community Empowerment

OUR PRODUCTS



20 Web Applications (Django, Perl & PHP)

300+ hosted CMS websites

Application RPM = 4000 - 8000

Budget: **Tight**

WEB APPLICATIONS

Electronic Referral
Electronic Waitlist
Service Coordination
Health Project Management
Patient Management
Content Management

SPECIALISING IN

Homelessness
Mental Health
Eldercare
Welfare

RICH SEARCH HISTORY

Infoxchange established the first searchable electronic directory of community services in Australia in 1990

Since the 90's Service Seeker has included:

Name search

Keyword search

Regional maps

Vacancy search

1990 - ARCHIE

Webpage Screenshot

Welcome to archie.icm.edu.pl

Archie Query Form



Search for:

Database: Worldwide Anonymous FTP Polish Web Index
Search Type: Sub String Exact Regular Expression
Case: Insensitive Sensitive

Do you want to look up strings only (no sites returned):
 NO YES

Output Format For Web Index Search: Keywords Only
 Excerpts Only Links Only

[Wersja polska](#) | [Help](#) | [Advanced Search](#)

Last changed on 01/24/1999 14:25:29 by [Wojtek Sylwestrzak](#)

http://archie.icm.edu.pl/archie_eng.html Fri May 30 2014 18:55:02 GMT+1000 (EST)

1991 - SERVICESSEEKER

Netscape - [Criteria]

File Edit View Go Bookmarks Options Directory Window Help

The info Xchange Criteria Search

The criteria search form is under development - we'd like [feedback](#) on this to help us get it working as you'd like it!

Please enter criteria words:

Suburb

Local Government Area

Human Services Region

Barwon South Western Region
Gippsland Region
Grampians Region
Hume Region
Loddon Mallee Region
Metropolitan East Region
Metropolitan North Region
Metropolitan South Region
Metropolitan West Region

DSS Region

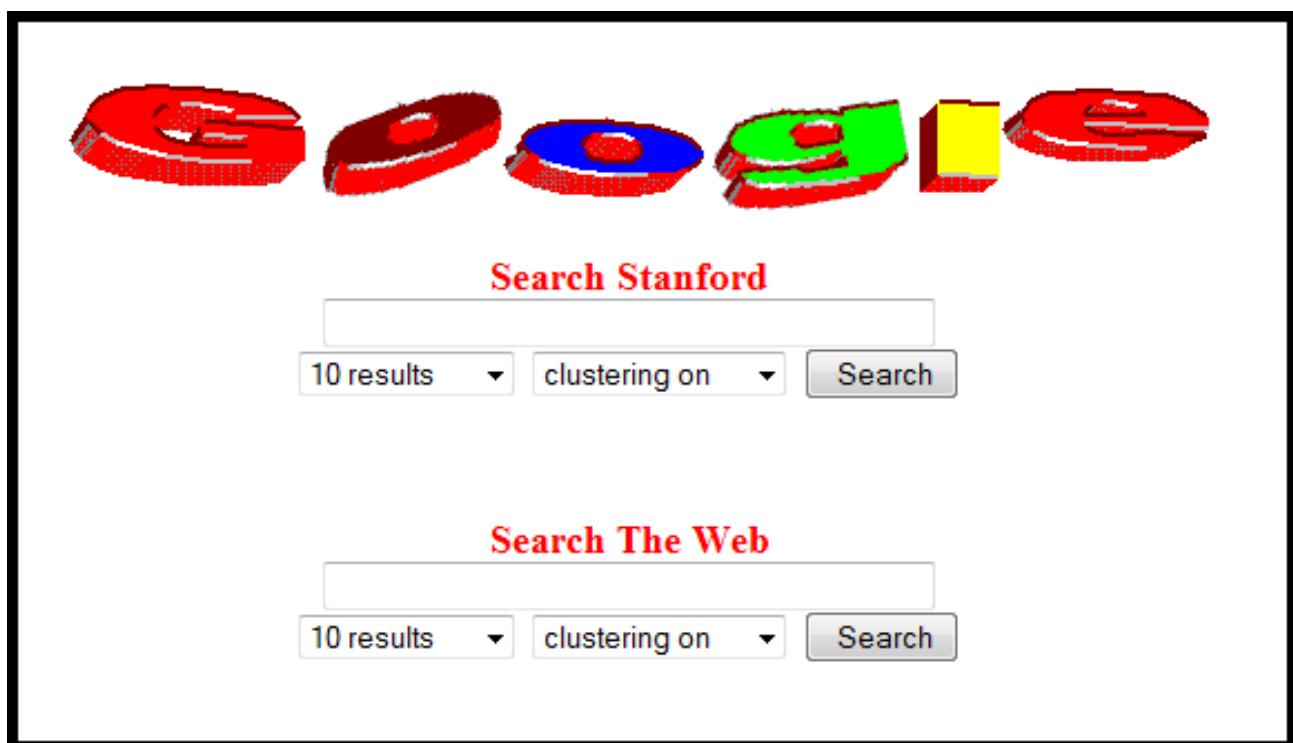
North
South
East

Select a service specifically for:

Children
 Youth
 Aged
 Family
 Female
 Male

Document Done

1995 - GOOGLE



1996 - SERVICESEEKER 2



Home | About | Add Your Service | Usage Policy | Copyright | Bookmark | Contact Us

Search

Australia's most extensive directory of community support services providing access to 331,979 health, welfare and community service records.

TEXT SEARCH

ACT | NSW | NT | QLD | SA | TAS | VIC | WA

Victoria

Quick Search Keyword Focus Provider Health Practitioner Name Health Focus Vacancy

Help

Search for:

Suburb/Town or Postcode:

Search

Show search options



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Created and hosted by



2014 - SERVICESEEKER 3 (API)

Services or keywords and suburb or postcode in NSW

Find services

Advanced Search

Displaying 100 results

Rosebank Child Sexual Abuse Service Liverpool

(02) 9601 3790 A counselling and support service for people who have been sexually abused.

[More information >](#)

Pregnancy Help Sydney Liverpool

(02) 9602 6543 Provides counselling, support and practical assistance for pregnant women and new mothers as well as pre and post termination counselling.

[More information >](#)

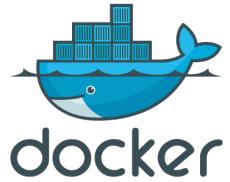
Pregnancy Counselling Service Liverpool

Pregnancy Help Sydney (02) 9602 6543 Confidential counselling and emotional support for those involved in a worrying pregnancy or those distressed after an abortion. Free pregnancy testing and a telephone support service are available.

[More information >](#)

Map showing the locations of the three services listed on the left. The map includes labels for various streets, landmarks, and buildings in Liverpool, with blue pins marking the specific locations of the services.

THE OPS JOURNEY



ENVIRONMENTAL CONSTRAINTS

Small Operations Team

Slow SAN Performance

Limited Hardware Resources

No Search experience & limited Java experience

~~LOTS of Technical Debt~~

~~Elderly Network~~

ENVIRONMENTAL STRENGTHS

Modern Tech: BTRFS, Docker, ZRAM & Kernel 3.14

Strong DevOps and Agile Practises

No Bureaucracy == Agility

Open Source Architecture

Newly Deployed Network

Hardworking, *Passionate* People

HIGHLY DIVERSE ENVIRONMENT

What the hell have you built.

- Did you just pick things at random?
- Why is Redis talking to MongoDB?
- Why do you even *use* MongoDB?

Goddamnit

Nevermind FREE



ES HOSTS

3 Node Clusters

OS = *Debian 7 (Wheezy)*

CPU = *8x E5-2660 0 @ 2.20GHz (24 Core Cluster)*

RAM = *10GB (30GB Cluster)*

Virt = *XenServer 6.2*

Kernel = *linux-3.14-amd64*

ES PERFORMANCE & TWEAKS

Heap size = half the available RAM:

```
ES_HEAP_SIZE = 5g
```

Faster shard recovery:

```
routing.allocation.node_initial_primaries_recoveries = 4,  
routing.allocation.node_concurrent_recoveries      = 15  
recovery.max_bytes_per_sec                      = 100mb,  
recovery.concurrent_stream                     = 5
```

Attempt to lock the process address space so it won't be swapped:

```
mlockall          = true,
```

Stop people from deleting all your nice things:

```
disable_delete_all_indices = true,
```

Ensure kernel keep-alive timeouts < routers timeouts!

TAKING OUT THE GARBAGE

"Stop-the-world garbage collection and blocking for disk IO can cause runtime latencies on the order of seconds to minutes."

Garbage collecting more often
=

less 'hit' to performance when it occurs

```
s/CMSInitiatingOccupancyFraction=[0-9]* /CMSInitiatingOccupancyFraction=35/g
```

<http://aphyr.com/posts/288-the-network-is-reliable>

MONITORING

Royrusso/ElasticHQ

Index Activity		How this Field is Calculated			
Indexing - Index				0.97ms	0.96ms
Indexing - Delete				0.14ms	0.11ms
Search - Query				16.06ms	7.26ms
Search - Fetch				1.65ms	1.46ms
Get - Total:				0.78ms	0.62ms
Get - Exists:				0.79ms	0.62ms
Get - Missing:				0ms	0ms
Refresh:		33.44ms		48.42ms	43.81ms
Flush:		58.36ms		56.34ms	45.94ms
Cache Activity					
Field Size:		168.5MB		85.7MB	88.9MB
Field Evictions:		0		0	0
Filter Cache Size:		16.3MB		9.8MB	13.3MB
Filter Evictions:		0 per query		0 per query	0 per query
ID Cache Size:					
% ID Cache:		0%		0%	0%
Memory					
Total Memory:		8 gb		8 gb	8 gb
Used Memory:		4 mb		4 mb	4 mb

MONITORING

Elasticsearch/Marvel

Powerful Cluster Insights

Easily Visualise Cluster Performance

Puts Metrics In Context

Creates Very Large Indexes

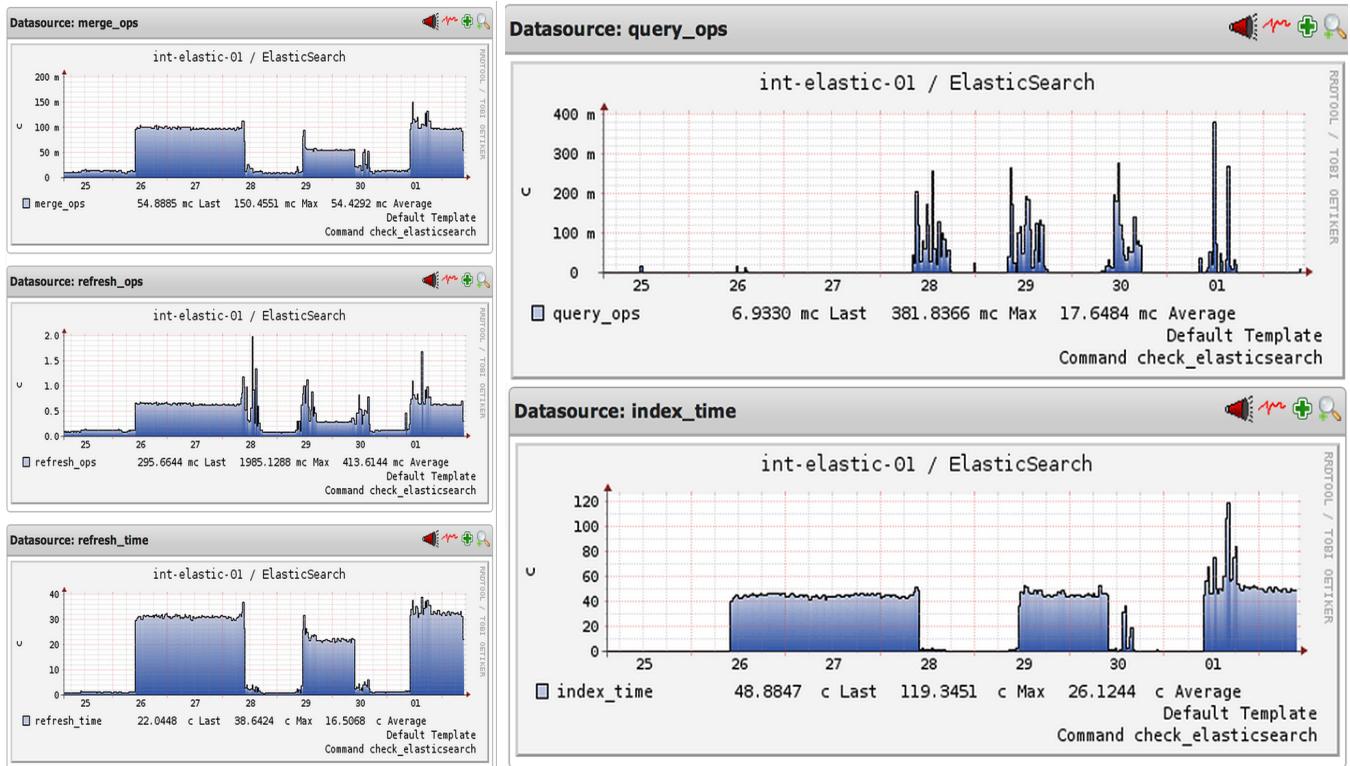
Doesn't Clean Up After Itself

No Longer Free

MONITORING

Nagios - PNP4Nagios

Aggregates Nagios Performance Information



MONITORING

Nagios + check_mk multisite

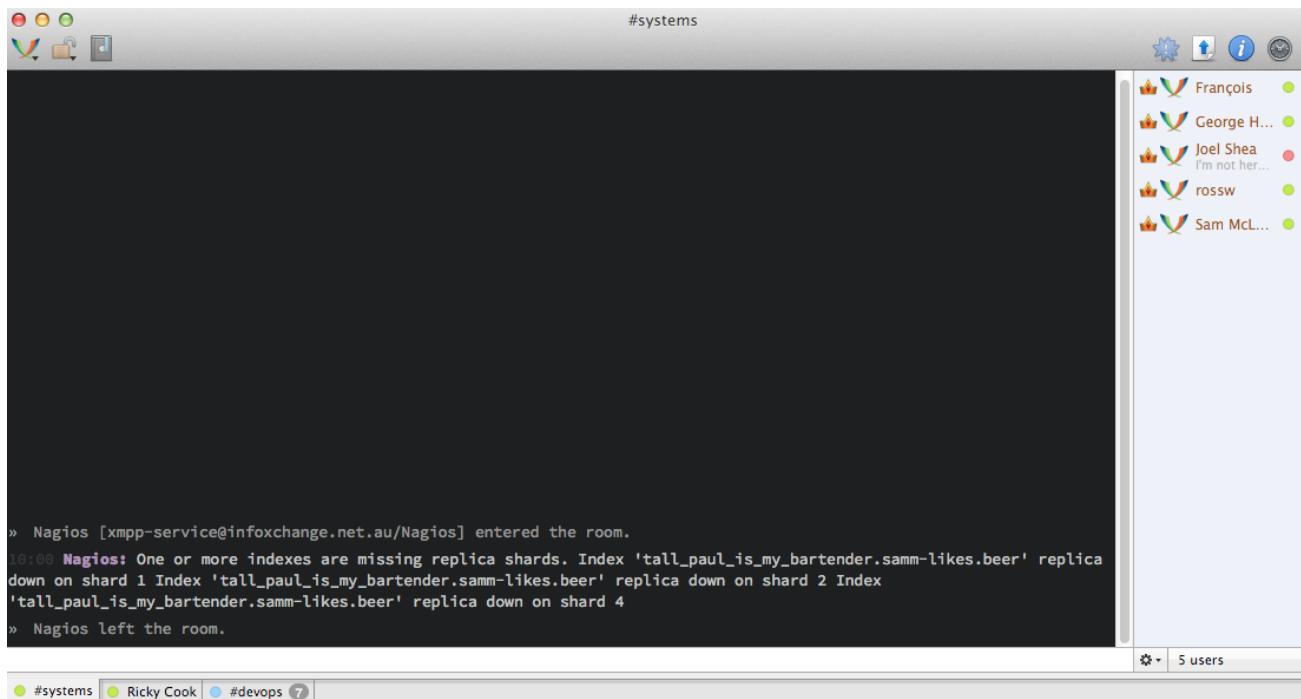
Cross-Site Elasticsearch Cluster Information

Events of recent 4 hours					
	Time	Host	Service	Check output	
	10 sec	int-elastic-03	ElasticSearch	Monitoring cluster 'int-elastic-cluster'	
	10 sec	int-elastic-01	ElasticSearch	Monitoring cluster 'int-elastic-cluster'	
	11 sec	int-elastic-02	ElasticSearch	Monitoring cluster 'int-elastic-cluster'	
	85 sec	int-elastic-01	ElasticSearch	One or more indexes are missing replica shards. Index 'test_iss3_small.rperez-django.dev-20140502-094121' replica down on shard 1 Index 'test_iss3_small.rperez-django.dev-20140502-094121' replica down on shard 2 Index 'test_iss3_small.rperez-django.dev-20140502-094121' replica down on shard 4	
	85 sec	int-elastic-03	ElasticSearch	One or more indexes are missing replica shards. Index 'test_iss3_small.rperez-django.dev-20140502-094121' replica down on shard 1 Index 'test_iss3_small.rperez-django.dev-20140502-094121' replica down on shard 2 Index 'test_iss3_small.rperez-django.dev-20140502-094121' replica down on shard 4	
	85 sec	int-elastic-02	ElasticSearch	One or more indexes are missing replica shards. Index 'test_iss3_small.rperez-django.dev-20140502-094121' replica down on shard 1 Index 'test_iss3_small.rperez-django.dev-20140502-094121' replica down on shard 2 Index 'test_iss3_small.rperez-django.dev-20140502-094121' replica down on shard 4	

MONITORING

Nagios + XMPP (Jabber)

Realtime Cluster Notifications



ES + LOGSTASH = SPLUNK4FREE

(Almost)



LOGSTASH

Puppet Managed Logstash Config

```
ixalogstash::input { 'syslog-docker':
  input_type      => 'syslog',
  type_tag       => 'docker',
  input_port     => 5550,
}

ixalogstash::input { 'syslog-nginx':
  input_type      => 'syslog',
  type_tag       => 'nginx',
  input_port     => 5551,
}

ixalogstash::filter { 'syslog-nginx':
  type_tag      => 'nginx',
  filter_match   => '%{COMBINEDAPACHELOG} %{QS:vhost}',
}

ixalogstash::output { "${elastic_host}":
  output_type    => 'elasticsearch',
}
```

<https://github.com/elasticsearch/puppet-logstash>

LESSONS LEARNT

Small Budget = Creative Solutions

Puppet is great for managing Elasticsearch & Logstash

Bulk indexing can be slow (more from ricky soon...)

Test for split-brain (before it happens)

Modern OS & kernel helps

Java GC is painful

LESSONS LEARNT

Puppet is great for managing Elasticsearch

Small budget = creative solutions

Bulk indexing can be slow

Test for split-brain (before it happens)

Modern OS & kernel helps

Java GC is painful

Kernel keep-alive timeouts < routers timeouts

RAM is cheap, buy *lots* of it

LINKS & REFERENCES

[Elasticsearch Pre-Flight Checklist](#)

[Elasticsearch JVM Settings Explained](#)

[On Elasticsearch Performance](#)

[Managing Elasticsearch Cluster Restart Time](#)

[Slow Cluster Restarts](#)

[Nagios Elasticsearch Plugin](#)

[Puppet Elasticsearch Module](#)

[Puppet Logstash Module](#)

[Grok Debugger](#)

[Linux TCP/IP Tuning](#)

[The Network Is Reliable](#)

THE DEV JOURNEY

It "worked" in dev :/

ISS2

Custom indexing (not just full text search!)

Stemming (sort of)

Keywords/Synonyms

Area search (not quite GIS)

ISS3



mozilla

(ElasticUtils)

... and Tasty Pie (which has no logo)

THE HARD PARTS

GIS searches

Private data

Query strings

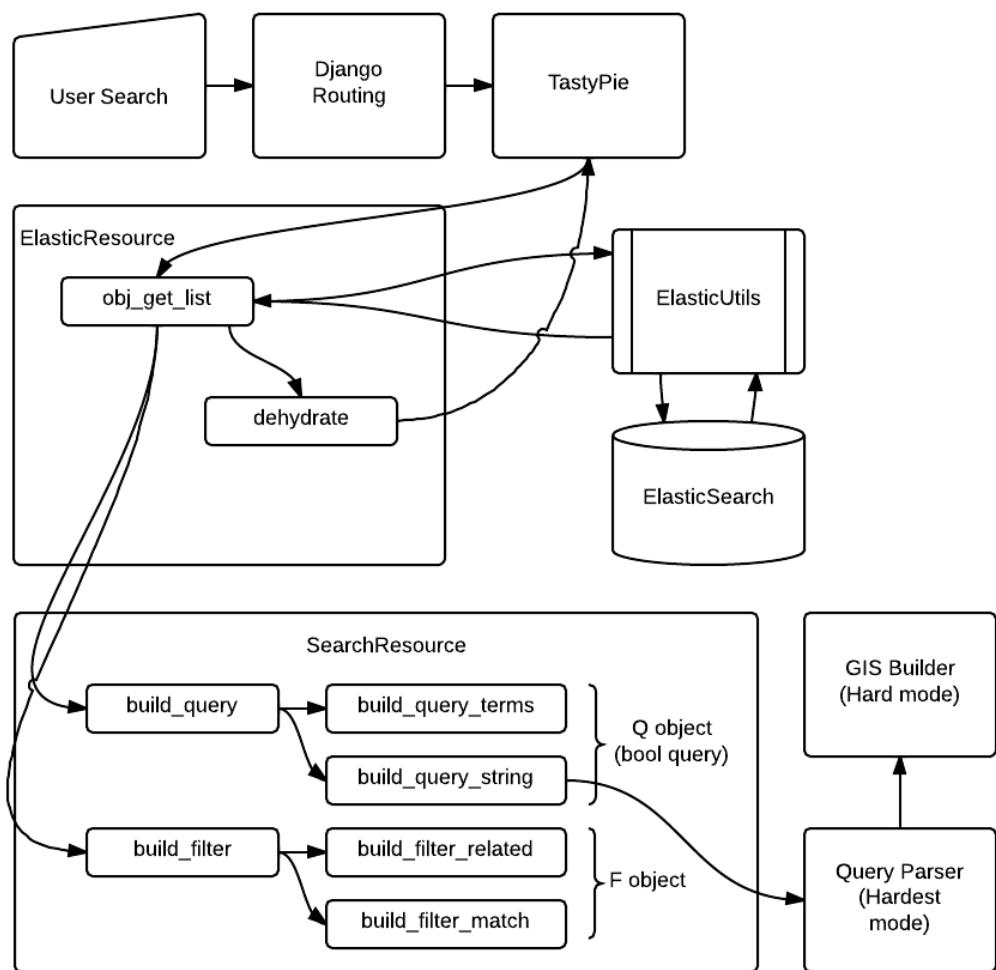
Keywords (I KNOW RIGHT?!)

Suggestions

Cascaded data (slow indexing)

ELASTICPIE

... for consuming, not eating



GEOSPATIAL SEARCH

GIS AND IDF LIKE OIL AND WATER

$$idf(t) = 1 + \log\left(\frac{numDocs}{docFreq + 1}\right)$$

Use function score! Ignores IDF and query normalization completely

INTELLIGENT QUERY STRINGS

doctor in richmond

doctor near richmond

doctor richmond

doctor near richmond nsw

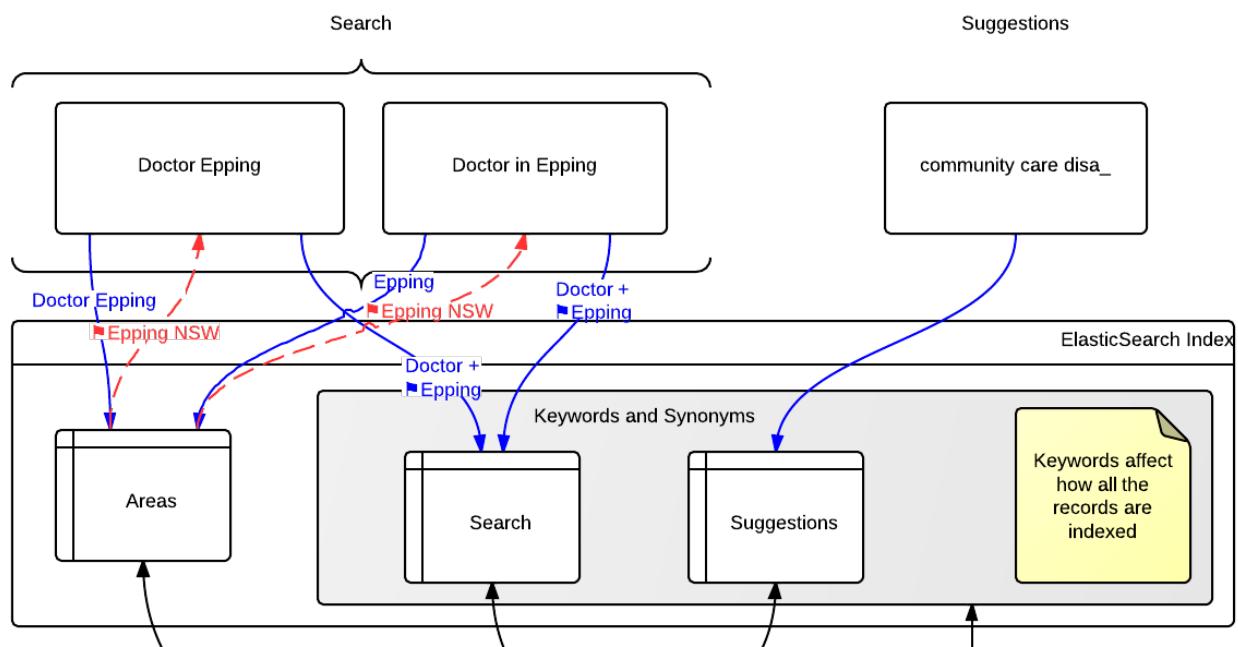
doctor near richmond new south wales

doctor near richmond town hall

doctor around richmond town hall that speaks chinese

female doctor around richmond qld that speaks chinese

ISS 4 DUMMIES



BANKS, ACT

blood banks

blood banks in banks

needles exchange (thank you Needles, TAS)

The Rocks, NSW... also The Rock, NSW

KEYWORDS

How is this even a problem?



KEYWORDS

New South Wales

Allied Health Services

Primary school

Alternative therapy

(Ab)use Synonym filters

```
"type": "synonym",
"synonyms": [
    "new south wales => new__south__wales,nsw",
    "primari school => primari school,primary__school",
    "altern therapi => altern therapi,alternative__therapy"
]
```

SUGGESTIONS

Completion suggester

✗ NOPE

Term suggester

✗ NOPE

Phrase suggester

✓ YES

Just kidding, ✗ NOPE

Fun with Markov chains

You can read it later...

CELERY: DISTRIBUTED TASKS

aka how we "fixed"
our indexer

(and addressed fault-tolerance)

THANK YOU

Sam McLeod - [@s_mcleod](#)
Ricky Cook - [@ThatPandaDev](#)

Infoxchange tech blog: [ixa.io](#)
Infoxchange website: [infoxchange.net.au](#)

LINKS & REFERENCES

Dev Links

[something](#)