Redis

Overview

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- Codes at

- Speaks at

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What is Redis

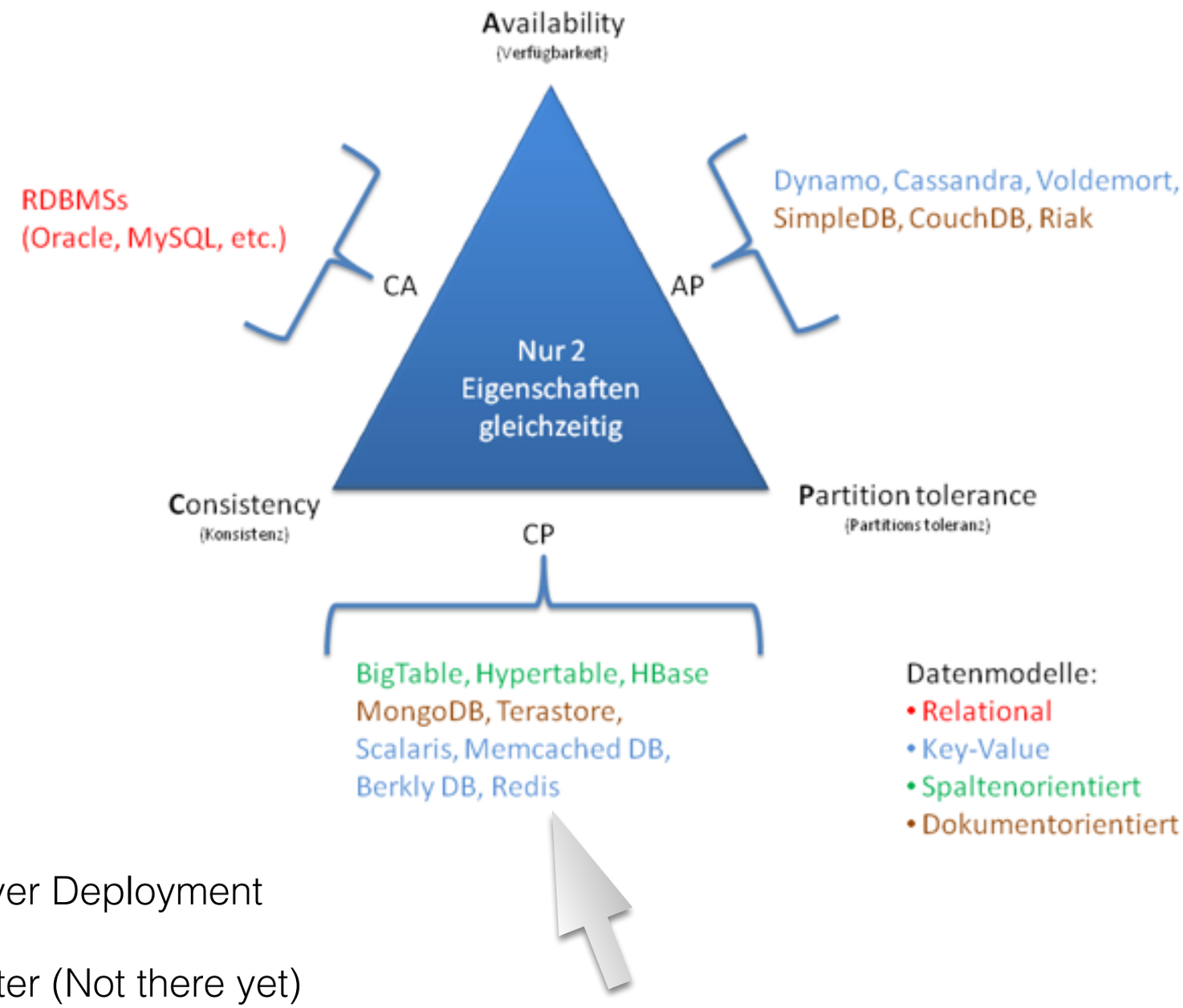
- Open Source In-Memory* key-value store, http://redis.io/
- written in C, BSD License, https://github.com/antirez/redis
- Author Salvatore Sanfilippo, Sponsored by Pivotal™

- Values can be binary strings, lists, sets, ordered sets, hashmaps
- set / get value, append to list, test for set membership, get all keys of hash map
- Very fast: ~100k ops/sec on entry-level hardware
- Single Threaded

*) offers Persistence options

redis

CAP



- CP: Single Server Deployment
- AP: Redis Cluster (Not there yet)

Functionality

- Flexible Key-/Value-Store
- Counters
- Messaging (Pub / Sub)
- Persistence
- Scripting (Lua)
- Transactions, … sort of …

Example Use cases

- Cache (HTTP Sessions, Application Objects, Images / Vides)
- Logging sink
- Base for fast Auto complete
- Counters / Statistics
- Messaging (Pub/Sub)
- Leaderboards (Players ranked by high-score)
- Relationships
- Activity Feeds

Installation

- Binary distribution
- Package Manager
  - e.g. OSX brew install redis
- build from source
  - download & make
- Runs best on Unix, unofficial Windows Ports available

Infrastructure

- Tools
  - redis-server
  - redis-cli
- Configuration

Configuration

- Command-line or redis.conf
- Live config changes
- Port (default 6739)
- Persistence
- Logging
- …

Commands

- http://redis.io/commands
- “Currently” 152 commands (according to $(“li[data-group]").size())
- Data Structure Specific, e.g.: sadd, zadd
- Individual commands are atomic
- Grouped into
  Admin, Data Structures, Messaging, TX, Scripting
- Helpful commands:
  info, help, type, monitor, save, shutdown

Keys

- strings
- logical namespaces via : or -
- domain:project:object:field
- in redis-cli> keys * //lists all currently defined keys
- in redis-cli> keys rugsaar:* //lists all keys “under” “rugger:”
  -> Note there is no indexing here
  -> internally the GLOB Pattern iterates over all keys

Values

- 5 Supported Data Structures
- string
- list
- set
- zset - Sorted set
- hash - Hashtable

string

- binary strings, can be treated as integer / float
- GET my-key
- SET my-key “abc”
- DEL my-key
- projections, e.g. GETRANGE my-key 1 2 -> “bc”
- Bitwise Operations
- INCR / DECR and variants

list

- List of untyped items
- [L|R]POP my-list //**L**POP remove **L**eft item, **R**POP remove **R**ight item
- [L|R]PUSH my-list i1 i2 i3
- LINDEX my-list 1
- LRANGE my-list 0 -1 //lists all items of my-list (-1 = end)
- LLEN my-list
- “exotic” operations like RPOPLPUSH src-list dest-list
  —> ask redis-cli for help ;-)

set

- Unorderd set of items
- SADD my-set i1 i2 i3
- SMOVE my-set other-set i2
- SMEMBERS my-set
- SCARD my-set
- SRANDMEMBER my-set
- Math. Set Operations (SDIFF, SINTER, SUNION)

zset

- Ordered set of items, order defined by “score”
- ZADD my-sorted-set 42.0 i1 -2.3 i2
- ZCARD my-sorted-set
- ZCOUNT my-sorted-set -2.0 41.99
- ZRANGEBYSCORE my-sorted-set 0.0 42.0 LIMIT 5 10
- ZINCBY my-sorted-set 20.0 i2

hash

- Assoziative Map
- HGET my-hash
- HSET my-hash key1 val1
- HGETALL my-hash
- HLEN my-hash
- HDEL my-hash key1
- HEXISTS my-hash key1
- HVALS my-hash
- HKEYS my-hash

Messaging

- Simple pub/sub Messaging Capabilities
- PUBLISH my-channel “My message” **Demo**
- SUBSCRIBE my-channel, my-other-channel
- UNSUBSCRIBE my-channel
- PSUBSCRIBE *-chan*
- PUNSUBSCRIBE my-channel

Expiration

- Time based automatic value cleanup
- TTL my-key
- PERSIST my-key
- EXPIRE my-key 10 //expire in 10 seconds
- EXPIREAT my-key 1384168184 //unix timestamp

Persistence

- 2 Options RDB and AOF
- RDB: Redis DB, periodic SNAPSHOT
- AOF: Append Only File, Logs Write Commands
- Can be combined —> Better Data Safety

Transactions

- Basically a grouping of commands
- Executed atomically
- multi … exec
- If redis receives “multi” … it buffers following commands and executes on receiving the “exec” command
- watch, unwatch, discard

Scaling

- Sharding (key level, twitter home grown sharing layer for timelines)
- Replication, (Master/Slave)
  Write to Master, read from Slaves / Snapshots are sent to slaves
- Pipelining
- Multiple instances
- Clustering (not there yet -> http://redis.io/topics/cluster-spec)

Scripting

- Lua
- SCRIPT LOAD
- EVAL / EVALSHA
- Block read/write operations while running

```
local login = redis.call('hget', KEYS[1], 'login')
if not login then
    return false
end
local id = redis.call('incr', KEYS[2])
local key = string.format('status:%s', id)

redis.call('hmset', key,
    'login', login,
    'id', id,
    unpack(ARGV))
redis.call('hincrby', KEYS[1], 'posts', 1)

return id
```

(Quick) Comparison

- Memcached
  - distribution built-in -> Availability
  - only one value (byte[])
- Riak
  - More powerful query capabilities
  - Rest Interface

Connectivity

- Ruby (redis via socket, ruby wrapper for hiredis)
- C (…)
- Java (Jedis, JRedis, Lettuce, SRP)
- .Net (…)
- Node / Javascript (…)
- …

Ruby example

```
require "redis"

redis = Redis.new

key = "rugsaar:meeting12:participant:count"

puts redis.set key, 1
puts redis.get key
puts redis.incr key
puts redis.get key
```

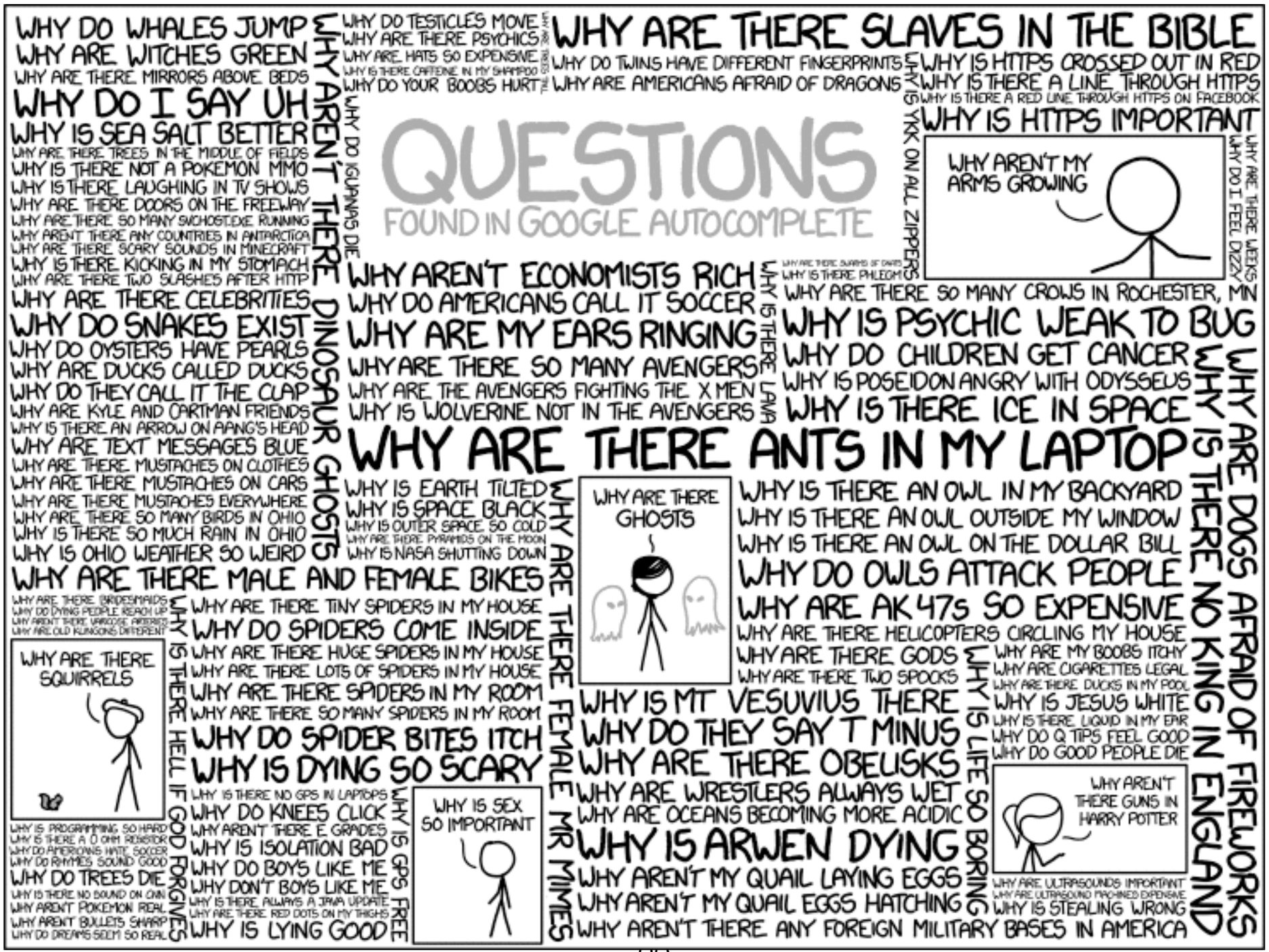
Assesment

- Advantages
  - Speed
  - Easy installation
  - Simple / Powerful API
  - Easy Adaptation
- Disadvantages
  - RAM limitations
  - Typeless
  - No complex queries
  - No “automatic” scaling (yet, ….)

Spring Data Redis

- http://projects.spring.io/spring-data-redis/
- Provides “defacto” Standard API on TOP of multiple drivers
- RedisTemplate
    - Translates to DataAccessException hierarchy
    - Descriptive Method names, Categories
      e.g., ListOps, ZSetOps, HashOps, ValueOps
    - convertAndSend(object) as XML, JSON, byte[]
- Redis backed Set, List, Map Collections and Atomic* structures
- Redis Messaging
    - RedisMessageListenerContainer analogue to (JMS) MessageListenerContainer

Questions?


QUESTIONS
FOUND IN GOOGLE AUTOCOMPLETE
WHY DO WHALES JUMP
WHY ARE WITCHES GREEN
WHY ARE THERE MIRRORS ABOVE BEDS
WHY DO I SAY UH
WHY IS SEA SALT BETTER
WHY ARE THERE TREES IN THE MIDDLE OF FIELDS
WHY IS THERE NOT A POKEMON MMO
WHY IS THERE LAUGHING IN TV SHOWS
WHY ARE THERE DOORS ON THE FREEWAY
WHY ARE THERE SO MANY SVCHOST.EXE RUNNING
WHY AREN'T THERE ANY COUNTRIES IN ANTARCTICA
WHY ARE THERE SCARY SOUNDS IN MINECRAFT
WHY IS THERE KICKING IN MY STOMACH
WHY ARE THERE TWO SLASHES AFTER HTTP
WHY ARE THERE CELEBRITIES
WHY DO SNAKES EXIST
WHY DO OYSTERS HAVE PEARLS
WHY ARE DUCKS CALLED DUCKS
WHY DO THEY CALL IT THE CLAP
WHY ARE KYLE AND CARTMAN FRIENDS
WHY IS THERE AN ARROW ON AANG'S HEAD
WHY ARE TEXT MESSAGES BLUE
WHY ARE THERE MUSTACHES ON CLOTHES
WHY ARE THERE MUSTACHES ON CARS
WHY ARE THERE MUSTACHES EVERYWHERE
WHY ARE THERE SO MANY BIRDS IN OHIO
WHY IS THERE SO MUCH RAIN IN OHIO
WHY IS OHIO WEATHER SO WEIRD
WHY ARE THERE MALE AND FEMALE BIKES
WHY ARE THERE BRIDESMAIDS
WHY DO DYING PEOPLE REACH UP
WHY AREN'T THERE VARICOSE ARTERIES
WHY ARE OLD KLINGONS DIFFERENT
WHY ARE THERE SQUIRRELS
WHY IS PROGRAMMING SO HARD
WHY IS THERE A 0 OHM RESISTOR
WHY DO AMERICANS HATE SOCCER
WHY DO RHYMES SOUND GOOD
WHY DO TREES DIE
WHY IS THERE NO BOUND ON OMN
WHY AREN'T POKEMON REAL
WHY AREN'T BULLETS SHARP
WHY DO DREAMS SEEM SO REAL
WHY AREN'T ECONOMISTS RICH
WHY DO AMERICANS CALL IT SOCCER
WHY ARE MY EARS RINGING
WHY ARE THERE SO MANY AVENGERS
WHY ARE THE AVENGERS FIGHTING THE X MEN
WHY IS WOLVERINE NOT IN THE AVENGERS
WHY ARE THERE ANTS IN MY LAPTOP
WHY IS EARTH TILTED
WHY IS SPACE BLACK
WHY IS OUTER SPACE SO COLD
WHY ARE THERE PYRAMIDS ON THE MOON
WHY IS NASA SHUTTING DOWN
WHY ARE THERE TINY SPIDERS IN MY HOUSE
WHY DO SPIDERS COME INSIDE
WHY ARE THERE HUGE SPIDERS IN MY HOUSE
WHY ARE THERE LOTS OF SPIDERS IN MY HOUSE
WHY ARE THERE SPIDERS IN MY ROOM
WHY ARE THERE SO MANY SPIDERS IN MY ROOM
WHY DO SPIDER BITES ITCH
WHY IS DYING SO SCARY
WHY IS THERE NO GPS IN LAPTOPS
WHY DO KNEES CLICK
WHY AREN'T THERE E GRADES
WHY IS ISOLATION BAD
WHY DO BOYS LIKE ME
WHY DON'T BOYS LIKE ME
WHY IS THERE ALWAYS A JAVA UPDATE
WHY ARE THERE RED DOTS ON MY THIGHS
WHY IS LYING GOOD
WHY IS SEX SO IMPORTANT
WHY ARE THERE GHOSTS
WHY IS MT VESUVIUS THERE
WHY DO THEY SAY T MINUS
WHY ARE THERE OBELISKS
WHY ARE WRESTLERS ALWAYS WET
WHY ARE OCEANS BECOMING MORE ACIDIC
WHY IS ARWEN DYING
WHY AREN'T MY QUAIL LAYING EGGS
WHY AREN'T MY QUAIL EGGS HATCHING
WHY AREN'T THERE ANY FOREIGN MILITARY BASES IN AMERICA
WHY IS THERE AN OWL IN MY BACKYARD
WHY IS THERE AN OWL OUTSIDE MY WINDOW
WHY IS THERE AN OWL ON THE DOLLAR BILL
WHY DO OWLS ATTACK PEOPLE
WHY ARE AK 47s SO EXPENSIVE
WHY ARE THERE HELICOPTERS CIRCLING MY HOUSE
WHY ARE THERE GODS
WHY ARE THERE TWO SPOCKS
WHY ARE MY BOOBS ITCHY
WHY ARE CIGARETTES LEGAL
WHY ARE THERE DUCKS IN MY POOL
WHY IS JESUS WHITE
WHY IS THERE LIQUID IN MY EAR
WHY DO Q TIPS FEEL GOOD
WHY DO GOOD PEOPLE DIE
WHY AREN'T THERE GUNS IN HARRY POTTER
WHY ARE ULTRASOUNDS IMPORTANT
WHY ARE ULTRASOUND MACHINES EXPENSIVE
WHY IS STEALING WRONG
WHY DO TESTICLES MOVE
WHY ARE THERE PSYCHICS
WHY ARE HATS SO EXPENSIVE
WHY IS THERE CAFFEINE IN MY SHAMPOO
WHY DO YOUR BOOBS HURT
WHY ARE THERE SLAVES IN THE BIBLE
WHY DO TWINS HAVE DIFFERENT FINGERPRINTS
WHY ARE AMERICANS AFRAID OF DRAGONS
WHY IS HTTPS CROSSED OUT IN RED
WHY IS THERE A LINE THROUGH HTTPS
WHY IS THERE A RED LINE THROUGH HTTPS ON FACEBOOK
WHY IS HTTPS IMPORTANT
WHY AREN'T MY ARMS GROWING
WHY ARE THERE SWARMS OF DARTS
WHY IS THERE PHLEGM
WHY ARE THERE SO MANY CROWS IN ROCHESTER, MN
WHY IS PSYCHIC WEAK TO BUG
WHY DO CHILDREN GET CANCER
WHY IS POSEIDON ANGRY WITH ODYSSEUS
WHY IS THERE ICE IN SPACE
WHY DO IGUANAS DIE
WHY AREN'T THERE FEMALE MR MIMES
WHY IS THERE HELL IF GOD FORGIVES
WHY IS GPS FREE
WHY IS LIFE SO BORING
WHY IS THERE NO KING IN ENGLAND
WHY ARE THERE DINOSAUR GHOSTS
WHY IS YKK ON ALL ZIPPERS
WHY ARE THERE WEEKS
WHY DO I FEEL DIZZY
WHY ARE THERE DOGS AFRAID OF FIREWORKS