```
SET and ExPIRE
 * Inmemory: Caching, Rate limiting
 * Traditional: Part of DB (Inmemory: Faster access), Remaining: Dlsk
 * Redls: Completely on RAM (Not on HDD/SSD)
                                                     hedls info:
  * Key-Valued DB, powerful.
  * eg: Stateless app (Central Storage bystem), Shapedata by muttiple
 apps (brutedorce attack Priso): Block them at every Service / app!
    * Redls: Conneck disconnected / Loosely conn. Seavices bhase a
                                              * key-value
 Common DB.
                                             * Column
     across multiple
                                             * Do cument
Redis Cli:
                                            * Graph
                                            INCR PUMBER
   * SET orgID (625721321)
                                         EXPIRE HOUG 10
   * GET torgED yours and stat youth
   * Don't overwrite: SETNX orgID (62572132222) No eggect as
                                                     already there!
   * multiple leks:

MSET Key1 (value 1) Key2 (value 2) Key3 (value 3)
 MGrET Key 1 Key 2 Key 3 Key 4
                               + High Pendormance, Scalable
   * Delate a Key:
 DEL Key 1
                                              A Year Jask 1
   GET Key 1 - # null
  * All Reties operations are atomic ( ipdate: ADECK! Trick! * The
  * must utility Look cache, messapt redriving TES all supports
             INCR humber ---- #11
             DECR number - + 10

Act lived data (web app scholors bis con
     * Expire:
             SET number 1
             EXPIRE number 1 -> apter 1 second number 95 deleted
                               * Course Cost logkers
      * TTL: Time to live:
              SET number 12 loveled tal DIAMO &
              TTL number (-1: Key exusts, no expiration bet)
                            (-2: Key hot exists)
```

Returns expiry time remaining in sec.

### SET and EXPIRE:

\* Traditional: fast of DR (Innomory: Paster access), Remaining: DUSK

#### Reds Info:

- \* Single threaded process: even on muticore trystem
  - \* Intended to sageguard read/writes!
- \* Is multithreaded: Need Locking (Pengermance www be worse)

\* Redies: Completely on RAM (Nick on HTD/SSD)

Sharding: Distribute dataset across muttiple

SET OYOTD "625721321"

Radles Phetances

Redre

\* Supports append only file people tence.

SET hous world

Incr number

EXPIRE hello 10

-> After the Run everything at once.

#### Redis:

- \* Open Source, BSD licented, Advanced key-Value Stone
- \* Data Structure Berry (String, hashos, lest, Sets..)
- \* Written 9n C
- \* High Pendormance, Scalable web apps In memory (use disk Rich data types
- \* Very Sask > 81K GETS Raplicate to any no. of
- \* Au Redes operations agre atomic (update value will be received)
- \* Multi Utility tool: Cache, messaging evueue (AS Redle Supports

SET number 1

Subscribe/publish)

\* Any Shork lived data (web app sessions, his count)

## Redie Config:

\* CONFIG GET \*

Raburus Expiry time remaining in sec

- \* ConvFIGs Coff Loglevel : avid at smit sitt x
- \* CONFIG SET LOGLEVEL "SEVERE"

TIL number (-1: Key expets, no expiration set)

(-2: Key hot exteks)

Data types: suprating Colubbian Bushing Sorton 1. String: (512 Mb) \$105F tog 1 SET name 'tukoriale point' > zadd key 1 op nom GET name nggor Lysy > 2 and 1000 2. Hashes; Luck \* XRANGIEBY SCORE \* Collection of Key-value pairs (map blu String fields & String values). Sepresent Objects. erabbit) Key (username) (password) (hello) (hi) (how) Hm SET. \* Large amount of data ! \* HONETALL the Ray now proporting rop boon on a side silver property cod - Only nodes Consistent Skope uper Objects: up to 2 32 - 1 field value pairs (more than 4 billion) called more cru, KAM x ustile herizontal scaling Posms Lates Chart > HMSET hello hi how age you william in a grings ? > HGETALL hellow sevi assimony primagnos anocodio \* Read write: Higher to Mosel Constructioned datiff \* Traditional DE: Taxos Edgark to change Schema woh \* Rebourse Patensive app : don't scale well. eyou? NosqL: Scale at ease! 3. LISK (List of Strings: Sorted by Inecation Order) > LPUSH ascerb 1 2 3 4 > 1Push SavatPoint Sava >LINDEX Users 0 -> #1 7 LRANGE users 0 -1 (suce) 7 1Pubh Savatpoint mongo Sort Sorted of 0 garatpoint > Erange 232\_1 clements "mongo" t biz approaq thos barading + e redes? 2 Exneame Carepated Indexas 4. Sets \*Unordered Collection of String: 0(1) add, Remove, Spanich for existence. > Sadd Key1 redls

> add key1 mongo

7 Sadd Kay 1

> Smembers

mongo

Key1 -

> tmongo

eredle 1

5. Sorked seks: \* Non-Prepeating Collection & String: Sorted. (Say Small -> great, > zadd kay 1 0 mongo (String (SIR MID) 3000 139 Key 1 0 rabble > zadd > ZRANGIEBY SCORE Key 1 0 1000 x concertion of Key-Yalue pairs (18th by string stelds & String volume) sopresent objects. (mongo "word" "id" (alle) when to use Nosel databases: \* Large amount of data: \* Highly replicable: No need for primary read lurite & only Secondary read-only nodes. Consistent Scope wer objects Horizontal Scaling: More machines Ventical Scaling: More CPU, RAM \* while horizontal Scaling: RDBms takes Cont! Strending: Split/posstition 91es ources in to Smallon pleces & destribute to disperent Computing resources. [Use closes DB: Latercy] \* Read/write: higher 9n Nogel (unstructured data) \* Traditional DB: Takes Chapte to Change Schema \* Robowske Intensive app: don't Scale well. NOSQL: Scale at ease! 8. List of Strings sorted by "resortion ordon) Redis: & 1 & woods Hough & Data Storage (Durability guaranteed by ledes) > Epach Data Struckuses Lest Set, Sorked Sat 1 Epush Hach Hach Pypoolog logs Savakpoint > Terange guoug? "vedes" → Streams → Geospatlal Index(es) A. Set5 \* Supports publish / subscribe pattern. > sadd Keys redia

> sudd Keys

> Smembeers

7 Sadd

Kays

o Buow

Keyt -

ob now

( o Buous)

"reduct

multimadel databases: \* Single Pritegrated backend server app \* Redus modules: pre built (JSON Support, SQL, 9 mage processing, Linean algebra, Indexes) x reduce off the checkmans) we sport very not single model: \* Bottleneck In access & deposement data! \* multimodel databases handles \* But recetly Strings (Conner) 1. Relational a. object-oriented 3. Kay value HSE? howe:5/00 numbed 3 4. Wide Column 5. Document Ett - hosman our sand sandy 6. Goraph models. Borked Seks 1 \* Stogne Structured & Semi Structured data \* Eliminates Foragmentation problem. Top multimodel DB Officers: Ducory, Index ( ovucony, Use index: especient vucou) Integration, Advanced becarity. 7 LINCRBY users do taxob - Increment taxob by 20 #33 Usecase: \*Auto complete, Result highlight \* Real kime analysis: Top score, Cosk, posk, bidding \* Froud detection: Spok trends ( ) saistan and small with suprem almody there: 15 yes: Not entered) \* Garning & leader boards \* Sees on mariagement 1.0.0.05 3 rodes v crant \* Social apport \* Recommendation manager \* Cache, publish/subscribe pattern for Incoming data \* Job/Queue management Pub Sub \* Builk in actions of gast & epicient resource of substance of substan Nottue. Json handling. Tratted cadinaldus | contabling on as segretary \* Publisher Coaster May value pair: of more \* Index, query: Search with high performances Lanch: \* Secondary Indexes

Cache: B/w Server & app (Forecup dB)

European E.

\*NO DB, NO tables

\* SET - To coreate data and organized between stant &

\* writes to dock at varying time interval (dustability income of spilures)

& object oriented

be Georgia modela.

1. Relational

equitioned detabases:

why not single model:

\* redus-cli -h <hostname> -P <porb>

\* Keys can be anything (As Binary Sage): Also use an Image as Key.

\* But mostly strings (Common)

#### Hoshes:

HSE? house: 5100 numbed 3 size 6000 hvac forced?

HGET havel: 5100 numbed - #3

#### Sorked Seks:

\* Leaden board (Score: Each member)

> ZADD usens 31 Sheve 2 owen 13 Sake

7 ZRANGE usenfollowers 0 -1 (0 to end) Top multimodes DB Bispers

7 ZRANGE abeats 0 -1 WITHSCORES

7 ZREVRANGE WEERS 0 -1 WITH SCORES

> ZINCRBY weens 20 Jakob ----> Incoment Bakob by 20 # 33

#### Hypeorlog:

\* Keep an estimate Court of unione Thems (eg: Track Court of arlyne Viegtors to a website), maintains gottennal hash idetermine already there: Pf Yes: Not entered) \* Geoming L leaders boards

> PFADD VIBSLOYS 127.0.0.1 -> 1 (new) 0 (24 alone only exports)

>PFCOUNT -> No. of unique hypeologis \* Cache, publish/subscribe pattern ger incoming data

#### pub/sub:

\* Redle can act as a dast 1 espicient means to exchange messages 9n a publisher/subscriben pattern.

\* publisher coneates key value pair: 0/more subscribers to docesoh greceive messages. \* Index, ordery; Leaser with high performa

> PUBLISH weather temp: 85\$

The message is published on the channel weather? The clear subscribed will receive

emessage?

e Lemp: 855

PUBLISH weather: 54481 temp:85\$

PSUBSCRIBE weather: (Sup) | </Sup)

# Good pattal Prodex es:

\* Lattende & Longikude data (destance)

- 7 GEORDD Lowers 89.500 44.500 Lowers 1 100
- > GEODIST Lowers Lowers Lowers # calculate destance
- > GEODIST Lowers towens kowens mi

# Rodes Streams:

\* data is appended like a log file (So only stream)

\* soe applies to every shoot

\* Reduce enterprise franches this differently! (writing): 80 kins is as

XRANGE

Pcan view pending messages & do powerful operations?

I single trousday long munifexec : executed)

# Redles modules:

- 1. Rodes Seanch: Full text search engine (with secondary Prodexing)

  powerful Numerying

  weighted beanch
  - 2. RedibJeon: Store Jeon 1 Inmemory manipulation.

    (product Catalogs, 3-rd pasky deals).
- 3. Redle Time Sovies: Skore kime Serves data (Added Kimeskamp)
- 4. Rodes Graph: Goraph DB Date and matthoog &
- 5. Rodes Bloom: Support additional probabilistic DS
- 6. Redis AI
- 7. Rades Greans : Batch/event deriver processing.
- \* Sharid: Takes Caone 8% a Subset 8% data
- \* proxy (Zero latency): Proxy to appropriate shand (each node of clusters uses proxy.
- \* Cluetes manages: manages cluetes health, monitoring (balance, Shoond,
  Provision/deprovision)

A: write que / don't (No pasitials): Atomic

C: Data Correct (Before/agten write): Consutent

rgidahoy

T: Each process: Seperate (Ibolation)

D: Dunability: Ensure data people tence:

Transaction Complete, retrieved

9ncase of failure,

A: MUTLI, WATCH, EXEC [Indivisible & ? reductible]

c: only permitted writers

single tronaded (only mutte/Exec: executed)

Data perelekence: (2 methods)

1. Aof (Append only file):

\* Rodis replies for each successful operation with

\* Lattende & Longskude data (deckance)

publich weather 54481 temp:856

\* ADF: apples to every shand

\* write every second: fast but not sage (slower performance)

\$ @ ECHDD Lowers - 89.500 44.500

> GEODIST Lowers knuess towers

\* Redus entemprise handles this dissemently! (writing): optimized

\* peoreormance unappossed as master shand unapposted.

2. Shapshot were new ages & do power the not was

\* point in time copy (For dunability rather than as backup) Rodes modules:

CAP theorem:

\*Impossible for a network based service (Somen) to

t. Redee Seasich: Full text treach Engine (with secondary Fridaing)

provide more that 2 out of romand that and world the

\* Consistency (Consuct gores replications)

bailicenty maroned

(make Copies across DCS)

5. Rodeb Bloom. Support additional probabilistic DS

\* proutition tolorance so dans de des A

Layers:

rangement layer: Administres cluster, placement of Storeds, Failure detection 2 mitgation

Data access layer: manage Connections (with Clients, pri/Sec \* proxy (2000 laborry): Froxy to appropri (brook and (each node of clue tea

In memory replecation using WAN: Sync!

Constict gover replicated Dataty PES

\* Charton managen; manages that

\* CRIDES: multiple coples stored across locations (Prodependently)

\* update, Rosolve Proconsistencies.

Constick: which one to use (math rules)

: 90000 at energy their sound Footers, fault tolerant.

Transaction Completes retrieved 90 case of tailure,

# Resources: \* Time \* Bik: No. of operations on biks newworld to run an algorithm \* Space 7 Unable to vuene (before starting) Atomicity: Fither occupy not! (MULTI, EXEC) (evenors Error in ovuceny! \* Exec: All done, All failed. \* Redle : doesn't Support roubacks! WATCH mykey! \* Conditional \*ExEc?: personn only when watched Keys are unmodified. \* modelication: client, Redle (expiration/eviction) \* when Exec is called: all keys are unwatched! coptimized locking? Inmemory DB: \* Rolles on RAM (fewer CPU 9nstruction), volatile. \* Splik data Pho multiple Redle Pretances. hedes people tence: \* Redus DB: Snashok In deboorant time Proteenval \* BOF: write In logs (every operation): Do everything to restore! RDB -> peoplet for backup (everyday to 30days) \_ dleaster recovery (DC), Faster restant! Not good to backup time long (data lost high as Protonval 1) I The consuming 95 done often assects penformance. Background (done), Append to old file Buggeon feles than RDB! As quest as RDB Inemory wage high! [every 608, 1000 Keys Changed atteast] Snapshok