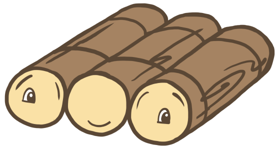
The Raft Consensus Algorithm



Quick Links

Raft paper (http://ramcloud.stanford.edu/raft.pdf)

raft-dev mailing list (https://groups.google.com/forum/#!forum/raft-dev)

Raft implementations

What is Raft?

Raft is a consensus algorithm that is designed to be easy to understand. It's equivalent to Paxos in fault-tolerance and performance. The difference is that it's decomposed into relatively independent subproblems, and it cleanly addresses all major pieces needed for practical systems. We hope Raft will make consensus available to a wider audience, and that this wider audience will be able to develop a variety of higher quality consensus-based systems than are available today.

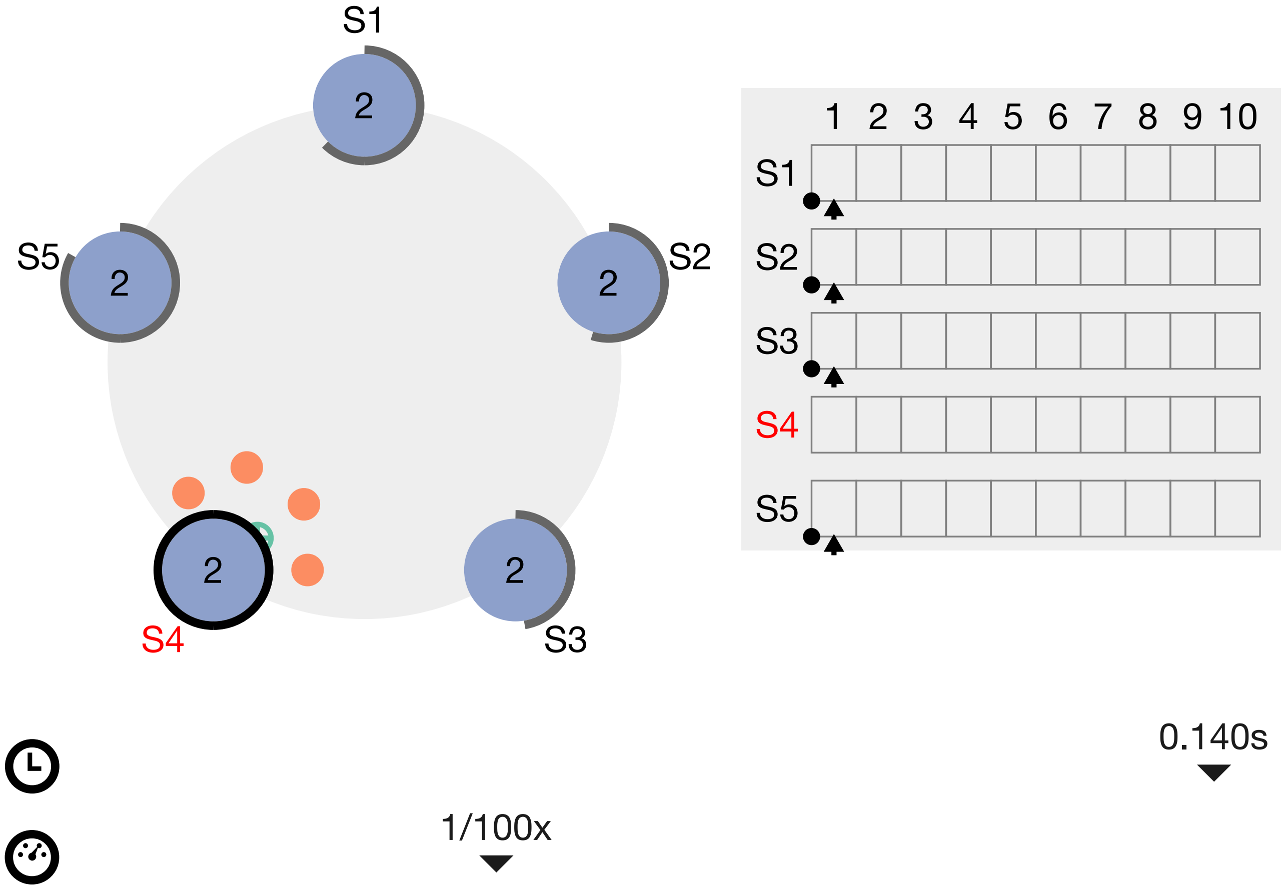
Hold on—what is consensus?

Consensus is a fundamental problem in fault-tolerant distributed systems. Consensus involves multiple servers agreeing on values. Once they reach a decision on a value, that decision is final. Typical consensus algorithms make progress when any majority of their servers are available; for example, a cluster of 5 servers can continue to operate even if 2 servers fail. If more servers fail, they stop making progress (but will never return an incorrect result).

Consensus typically arises in the context of replicated state machines, a general approach to building fault-tolerant systems. Each server has a state machine and a log. The state machine is the component that we want to make fault-tolerant, such as a hash table. It will appear to clients that they are interacting with a single, reliable state machine, even if a minority of the servers in the cluster fail. Each state machine takes as input commands from its log. In our hash table example, the log would include commands like *set x to 3*. A consensus algorithm is used to agree on the commands in the servers' logs. The consensus algorithm must ensure that if any state machine applies *set x to 3* as the n^{th} command, no other state machine will ever apply a different n^{th} command. As a result, each state machine processes the same series of commands and thus produces the same series of results and arrives at the same series of states.

Raft Visualization

Here's a Raft cluster running in your browser. You can interact with it to see Raft in action. Five servers are shown on the left, and their logs are shown on the right. We hope to create a screencast soon to explain what's going on. This visualization (RaftScope (https://github.com/ongardie/raftscope)) is still pretty rough around the edges; pull requests would be very welcome.



The Secret Lives of Data (http://thesecretlivesofdata.com/raft/) is a different visualization of Raft. It's more guided and less interactive, so it may be a gentler starting point.

Publications

This is "the Raft paper", which describes Raft in detail: In Search of an Understandable Consensus Algorithm (Extended Version) (http://ramcloud.stanford.edu/raft.pdf) by Diego Ongaro (https://twitter.com/ongardie) and John Ousterhout (http://www.stanford.edu/~ouster/). A slightly shorter version of this paper received a Best Paper Award at the 2014 USENIX Annual Technical Conference (https://www.usenix.org/conference/atc14/technical-sessions/presentation/ongaro).

Diego Ongaro's Ph.D. dissertation (https://github.com/ongardie/dissertation#readme) expands on the content of the paper in much more detail, and it includes a simpler cluster membership change algorithm.

More Raft-related papers:

- Doug Woos, James R. Wilcox, Steve Anton, Zachary Tatlock, Michael D. Ernst, and Thomas Anderson.
  Planning for Change in a Formal Verification of the Raft Consensus Protocol (http://verdi.uwplse.org/).
  Certified Programs and Proofs (CPP), January 2016.
- James R. Wilcox, Doug Woos, Pavel Panchekha, Zachary Tatlock, Xi Wang, Michael D. Ernst, and Thomas Anderson.
  Verdi: A Framework for Implementing and Verifying Distributed Systems (http://verdi.uwplse.org/).
  Programming Language Design and Implementation (PLDI), June 2015.
- Hugues Evrard and Frédéric Lang.
  Automatic Distributed Code Generation from Formal Models of Asynchronous Concurrent Processes (https://hal.inria.fr/hal-01086522).
  Parallel, Distributed, and Network-Based Processing (PDP), March 2015.
- Heidi Howard (https://twitter.com/heidiann360), Malte Schwarzkopf, Anil Madhavapeddy, and Jon Crowcroft.
  Raft Refloated: Do We Have Consensus? (http://www.cl.cam.ac.uk/~ms705/pub/papers/2015-osr-raft.pdf).
  SIGOPS Operating Systems Review, January 2015.
- Heidi Howard.
  ARC: Analysis of Raft Consensus (http://www.cl.cam.ac.uk/techreports/UCAM-CL-TR-857.html).
  University of Cambridge, Computer Laboratory, UCAM-CL-TR-857, July 2014.

Talks

These talks serve as good introductions to Raft:

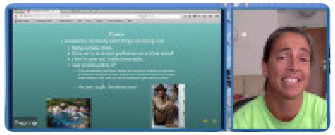
Talk on Raft at Build Stuff 2015 (http://buildstuff.lt/) by Diego Ongaro (https://twitter.com/ongardie), November 2015:

Video Coming Soon

Slides	HTML (https://ongardie.github.io/raft-talk-archive/2015/buildstuff/) PDF (slides/buildstuff2015.pdf) with RaftScope visualization (https://ongardie.github.io/raft-talk-archive/2015/buildstuff/raftscope-replay/)

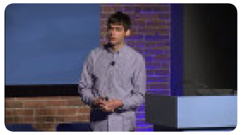
Talks on Rust, Raft, and distributed systems at Rust Bay Area Meetup (http://www.meetup.com/Rust-Bay-Area/events/219696985/) by Yvonne Coady (http://webhome.cs.uvic.ca/~ycoady/), Diego Ongaro (https://twitter.com/ongardie), Andrew Hobden (https://twitter.com/andrewhobden), Dan Burkert (https://github.com/danburkert), and Alex Newman (https://twitter.com/posix4e), August 2015:

Video	Air Mozilla (https://air.mozilla.org/bay-area-rust-meetup-august-2015/)
Slides	Diego: PDF (slides/rustdiego2015.pdf) with RaftScope visualization (raftscope-replay/index.html)



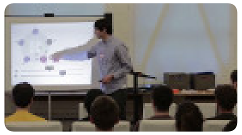
Talk on Raft at CoreOS Fest 2015 (https://coreos.com/fest/) by Diego Ongaro (https://twitter.com/ongardie), May 2015:

Video	YouTube (https://youtu.be/6bBggO6KN_k)
Slides	PDF (slides/coreosfest2015.pdf) with RaftScope visualization (raftscope-replay/index.html)



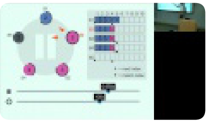
Talk on Raft at Sourcegraph meetup (http://www.meetup.com/Sourcegraph-Hacker-Meetup/events/221199291/) by Diego Ongaro (https://twitter.com/ongardie), April 2015:

Video	YouTube (https://youtu.be/2dfSOFqOhOU)
Slides	PDF (slides/sourcegraph2015.pdf) with RaftScope visualization (raftscope-replay/index.html)



Talk on Raft at LinkedIn by Diego Ongaro (https://twitter.com/ongardie), September 2014:

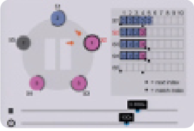
Video	YouTube (http://youtu.be/LAqyTyNUYSY)
Slides	PDF (slides/linkedin2014.pdf) PPTX (slides/linkedin2014.pptx) with RaftScope visualization (raftscope-replay/index.html)



Talk on Raft at USI 2014 (http://www.usievents.com/en) and /dev/summer 2014 (http://devcycles.net/summer/sessions/index.php?session=3) by Arnaud Bailly (https://twitter.com/abailly), July 2014:

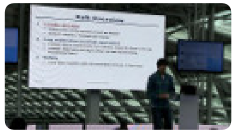
Video	YouTube (https://www.youtube.com/watch?v=eRDq2Fr6grY) (French)
Slides	Speaker Deck (https://speakerdeck.com/abailly/the-raft-protocol-distributed-consensus-for-dummies) (English)

Talk on Raft at 2014 USENIX Annual Technical Conference (https://www.usenix.org/conference/atc14/technical-sessions/presentation/ongaro) by Diego Ongaro (https://twitter.com/ongardie), June 2014:



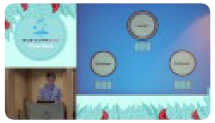
Video	USENIX (https://www.usenix.org/conference/atc14/technical-sessions/presentation/ongaro)
Slides	RaftScope visualization (raftscope-replay/index.html)

Talk on Raft at CraftConf 2014 (http://craft-conf.com/2014/#speakers/DiegoOngaro) by Diego Ongaro (https://twitter.com/ongardie), April 2014:



Video	Ustream (http://www.ustream.tv/recorded/46672856)
Slides	PDF (slides/craftconf2014.pdf) PPTX (slides/craftconf2014.pptx)

Talk on Raft at Rubyconf 2013 (http://rubyconf.org/program#patrick-van-stee) by Patrick Van Stee (https://twitter.com/vanstee), November 2013:



Video	YouTube (http://youtu.be/IsPxhZ2IsWw)
Slides	Speaker Deck (https://speakerdeck.com/vanstee/raft-consensus-for-rubyists)

Talk on Raft at RICON West 2013 (http://ricon.io/west.html) by Diego Ongaro (https://twitter.com/ongardie), October 2013:

Video	YouTube (http://youtu.be/06cTPhi-3_8)
Slides	PDF (slides/riconwest2013.pdf) PPTX (slides/riconwest2013.pptx)

Talk on Raft at Strange Loop 2013 (https://thestrangeloop.com/sessions/raft-the-understandable-distributed-protocol) by Ben Johnson (https://twitter.com/benbjohnson), September 2013:

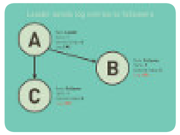
Video	InfoQ (http://www.infoq.com/presentations/raft)
Slides	Speaker Deck (https://speakerdeck.com/benbjohnson/raft-the-understandable-distributed-consensus-protocol)

Talk on Raft and Rafter (https://github.com/andrewjstone/rafter) at the Erlang NYC Meetup (http://www.meetup.com/Erlang-NYC/events/131394712/) by Tom Santero (https://twitter.com/tsantero) and Andrew Stone (https://twitter.com/andrew_j_stone), August 2013:

Consensus, Raft and Rafte

Video	Vimeo (http://vimeo.com/71635670)
Slides	Speaker Deck (https://speakerdeck.com/tsantero/consensus-raft-and-rafter)

Talk on Raft (venue unknown) by Patrick Van Stee (https://twitter.com/vanstee), July 2013:



Slides	Speaker Deck (https://speakerdeck.com/vanstee/consensus-an-introduction-to-raft)

Lecture for the Raft User Study (https://ramcloud.stanford.edu/~ongaro/userstudy/) by John Ousterhout (http://www.stanford.edu/~ouster/), March 2013:

Raft Overview

Video (screencast)	YouTube (http://youtu.be/YbZ3zDzDnrw) MP4 (http://raftuserstudy.s3-website-us-west-1.amazonaws.com/raft.mp4)
Slides	PDF (slides/raftuserstudy2013.pdf) PPTX (slides/raftuserstudy2013.pptx)

Courses teaching Raft

This is a list of courses that include lectures or programming assignments on Raft. This might be useful for other instructors and for online learners looking for materials. If you know of additional courses, please submit a pull request (https://github.com/raft/raft.github.io) or an issue to update it.

- University of Colorado, Boulder (http://www.cs.colorado.edu/), CSCI 5673: Distributed Systems (http://www.cs.colorado.edu/~mishras/courses/csci5673/Fall15/), Shivakant Mishra (http://www.cs.colorado.edu/~mishras/). Includes assignment to download a Raft implementation and build a fault-tolerant data structure with it. (Fall 2015, ...)

- University of Utah (http://www.cs.utah.edu/), CS 6963: Distributed Systems (http://www.cs.utah.edu/~stutsman/cs6963/), Ryan Stutsman (http://www.cs.utah.edu/~stutsman/) (@rstutsman (https://twitter.com/rstutsman)). Will include something about Raft (TBD). (Fall 2015, ...)
- Brown (http://cs.brown.edu/), CS 138: Distributed Computer Systems (http://cs.brown.edu/courses/csci1380/), Tom Doeppner (https://www.cs.brown.edu/~twd/), Rodrigo Fonseca (https://www.cs.brown.edu/~rfonseca/) (@rodrigo_fonseca (https://twitter.com/rodrigo_fonseca)). Includes Raft programming assignment in Go. (Spring 2015, ...)
- MIT (https://www.csail.mit.edu/), 6.824: Distributed Systems (http://nil.csail.mit.edu/6.824/2015/index.html), Robert Morris (http://pdos.csail.mit.edu/~rtm/). Includes lecture on Raft (lecture notes (http://nil.csail.mit.edu/6.824/2015/notes/l-raft.txt)). (Spring 2015, ...)
- University of San Francisco (http://cs.usfca.edu/), CS 636: Graduate Operating Systems (http://cs636.cs.usfca.edu/home), Greg Benson (http://benson.cs.usfca.edu/) (@gregorydbenson (https://twitter.com/gregorydbenson)). Includes lecture on Raft. (Spring 2015, ...)
- Harvard (http://www.eecs.harvard.edu/), CS 261: Research Topics in Operating Systems (http://www.eecs.harvard.edu/cs261/), Margo Seltzer (http://www.eecs.harvard.edu/margo). Includes lecture on Raft (lecture notes (http://www.eecs.harvard.edu/cs261/notes/ongara-2014.html)). (Fall 2014, ...)
- University of Houston (http://www2.cs.uh.edu/), COSC 6360: Operating Systems (http://www2.cs.uh.edu/~paris/6360/resources.htm), Jehan-François Pâris (http://www2.cs.uh.edu/~paris/) (@jehanfrancois (https://twitter.com/jehanfrancois)). Includes lecture on Raft (PPT (http://www2.cs.uh.edu/~paris/6360/PowerPoint/Raft.ppt)). (Fall 2014, ...)
- Stanford (https://cs.stanford.edu/), CS 244b: Distributed Systems (http://www.scs.stanford.edu/14au-cs244b/), Dawson Engler (http://web.stanford.edu/~engler/), David Mazières (http://www.scs.stanford.edu/~dm/) (@dmazieres (https://twitter.com/dmazieres)). Included guest lecture on Raft by Diego Ongaro. Several students chose to work on Raft-based final projects (http://www.scs.stanford.edu/14au-cs244b/labs/presentations.html). (Fall 2014)
- NUST-SEECS (http://seecs.nust.edu.pk/), CS 332: Distributed Computing (http://tahirazim.com/cs332/), Tahir Azim (http://tahirazim.com/) (@TahirAzim (https://twitter.com/TahirAzim)). Includes lecture on Raft based on user study materials (tweet (https://twitter.com/TahirAzim/status/527363109678112768)). (Fall 2014, ...)
- Duke (http://www.cs.duke.edu/), CPS 512: Distributed Systems (http://db.cs.duke.edu/courses/compsci512/spring15/), Bruce Maggs (http://www.cs.duke.edu/~bmm/). Includes guest lecture on Raft (PPTX (http://db.cs.duke.edu/courses/compsci512/spring15/lectures/raft-guest.pptx)) by Landon Cox (http://www.cs.duke.edu/~lpcox/) (@lpcox (https://twitter.com/lpcox)). (Spring 2014, Spring 2015, ...)
- IIT Bombay (http://www.cse.iitb.ac.in/), CS 733: Cloud Computing (http://www.cse.iitb.ac.in/page134?course=CS+733), Sriram Srinivasan (https://github.com/sriram-srinivasan). Includes Raft programming assignment in Go (assignments (https://github.com/dushyant89/CS-733)). (Spring 2014, Spring 2015, ...)

Where can I ask questions?

The best place to ask questions about Raft and its implementations is the raft-dev Google group (https://groups.google.com/forum/#!forum/raft-dev). Some of the implementations also have their own mailing lists; check their READMEs.

Where can I get Raft?

There are many implementations of Raft available in various stages of development. This table lists the implementations we know about with source code available. The most popular and/or recently updated implementations are towards the top. This information will inevitably get out of date; please submit a pull request (https://github.com/raft/raft.github.io) or an issue to update it.

Name	Primary Authors	Language	License	Leader Election + Log Replication?	Membership Changes?	Log Compa
etcd/raft (https://github.com/coreos/etcd)	Blake Mizerany, Xiang Li and Yicheng Qin	Go	Apache 2.0	Yes	Yes	Yes
RethinkDB/clustering (https://github.com/rethinkdb/rethinkdb)		C++	AGPL	Yes	Yes	Yes
kanaka/raft.js (https://github.com/kanaka/raft.js)	Joel Martin (https://twitter.com/bus_kanaka)	Javascript	MPL-2.0	Yes	Yes	No
hashicorp/raft (https://github.com/hashicorp/raft)	Armon Dadgar (https://twitter.com/armon) (hashicorp)	Go	MPL-2.0	Yes	Yes	Yes
LogCabin (https://github.com/logcabin/logcabin)	Diego Ongaro (https://twitter.com/ongardie) (Stanford)	C++	ISC	Yes	Yes	Yes
go-raft (https://github.com/goraft/raft)	Ben Johnson (https://twitter.com/benbjohnson)(Sky) and Xiang Li	Go	MIT	Yes	Partial?	Yes

	(https://twitter.com/xiangli0227) (CMU, CoreOS)					
hoverbear/raft (https://github.com/Hoverbear/raft)	Andrew Hobden (https://twitter.com/andrewhobden), Dan Burkert	Rust	MIT	Yes		
willemt/raft (https://github.com/willemt/raft)	Willem-Hendrik Thiart (https://twitter.com/willemht)	C	BSD	Yes	Yes	No
rafter (https://github.com/andrewjstone/rafter)	Andrew Stone (https://twitter.com/andrew_j_stone) (Basho)	Erlang	Apache2			
akka-raft (https://github.com/ktoso/akka-raft)	Konrad Malawski (https://twitter.com/ktosopl)	Scala	Apache2	Yes	Yes	Yes
verdi/raft (https://github.com/uwplse/verdi)	James Wilcox, Doug Woos, Pavel Panchekha, Zach Tatlock, Xi Wang, Mike Ernst, and Tom Anderson (University of Washington)	Coq	BSD	Yes	No	No
kontiki (https://github.com/NicolasT/kontiki)	Nicolas Trangez (https://twitter.com/eikke)	Haskell	BSD	Some	No	No
zraft_lib (https://github.com/dreyk/zraft_lib)	Gunin Alexander	Erlang	Apache2	yes	yes	yes
OpenDaylight (https://github.com/opendaylight/controller)	Moiz Raja, Kamal Rameshan, Robert Varga (Cisco), Tom Pantelis (Brocade)	Java	Eclipse	Yes	No	Yes
fxsjy/Ins (https://github.com/fxsjy/ins)	Junyi Sun	C++	BSD	Yes	No	Yes
peterbourgon/raft (https://github.com/peterbourgon/raft)	Peter Bourgon (https://twitter.com/peterbourgon) (SoundCloud)	Go	Simplified BSD	Yes	Yes	No
ckite (https://github.com/pablosmedina/ckite)	Pablo Medina	Scala	Apache2	Yes	Yes	Yes

	(https://twitter.com/pablosmedina)					
raft-clj (https://github.com/saebyn/raft)	John Weaver	Clojure	Eclipse			
py-raft (https://github.com/kurin/py-raft)	Toby Burress	Python	public domain	Lacking persistence	Yes	No
copycat (https://github.com/atomix/copycat)	Jordan Halterman (https://twitter.com/definekuujo)	Java	Apache2	Yes	Yes	Yes
jgroups-raft (https://github.com/belaban/jgroups-raft)	Bela Ban	Java	Apache2	Yes	Yes	Yes
floss (https://github.com/celluloid/floss)	Alexander Flatter (https://twitter.com/aflatter)	Ruby	MIT			
ocaml-raft (https://github.com/heidi-ann/ocaml-raft)	Heidi Howard (https://twitter.com/heidiann360) (Cambridge)	OCaml	MIT	Yes	No	No
allengeorge/libraft (https://github.com/allengeorge/libraft)	Allen George (https://twitter.com/allenageorge)	Java	BSD	Yes	No	No
srned/Prez (https://github.com/srned/Prez)	Sureshkumar Nedunchezhian	C	BSD	Yes	No	No
liferaft (https://github.com/unshiftio/liferaft)	Arnout Kazemier (https://twitter.com/3rdEden)	Javascript	MIT			
harryw/raft (https://github.com/harryw/raft)	Harry Wilkinson (https://twitter.com/harwilk)	Ruby	MIT			
skiff (https://github.com/pgte/skiff-algorithm)	Pedro Teixeira (https://twitter.com/pgte)	Javascript	ISC	Yes	Yes	Yes
barge (https://github.com/mgodave/barge)	Dave Rusek (https://twitter.com/davidjrusek)	Java	Apache2	Yes	No	No

simpleRaft (https://github.com/streed/simpleRaft)	Sean Reed	Python	MIT			
Gondola (https://github.com/yahoo/gondola)	Patrick Chan, Wei-Cheng Pan	Java	New BSD	Yes	Yes	In progr
Flotten (https://github.com/haf/Flotten)	Henrik Feldt (https://twitter.com/henrikfeldt) (Jayway)	F#	MIT	Some	No	No
cppa-raft (https://github.com/echaozh/cppa-raft)	Zhang Yichao	C++	MIT	Partial	No	No
RaftKVDatabase/JSimpleDB (https://github.com/archiecobbs/jsimpledb)	Archie Cobbs	Java	Apache 2.0	Yes	Yes	Yes
dupdob/RAFTiNG (https://github.com/dupdob/RAFTiNG)	Cyrille Dupuydauby	C#	Apache2			
NRaft (https://github.com/devatwork/NRaft)	Bert Willems (Premotion)	C#	MIT			
archie/raft (https://github.com/archie/raft)	Marcus Ljungblad (https://twitter.com/mljungblad)	Scala		Some	No	No
rafute (https://github.com/mururu/rafute)	Yuki Ito (https://twitter.com/mururururu)	Elixir	MIT	Yes	No	No
C5 replicator (https://github.com/cloud-software-foundation/c5-replicator/)	Ryan Rawson (https://twitter.com/ryanobjc), Alex Newman (https://twitter.com/posix4e), and Josh Greenberg (https://github.com/joshua-g/)	Java	Apache2	Yes	Yes	Yes
Chillaxd (https://github.com/ylamgarchal/chillaxd)	Yassine Lamgarchal	Python	Apache2	Yes	No	No
pontoon	Matt Reiferson	Go				

(https://github.com/mreiferson/pontoon)	(https://twitter.com/imsnakes)					
chicm/CmRaft (https://github.com/chicm/CmRaft)	Cheng Min Chi	Java	Apache2	Yes	No	No
eraft (https://github.com/djui/eraft)	Uwe Dauernheim (https://twitter.com/uwe_)	Erlang				
melee (https://github.com/wayoutmind/melee)	Fredrick Galoso (https://twitter.com/wayoutmind)	Clojure	Eclipse			
gaggle (https://github.com/ben-ng/gaggle)	Ben Ng (https://twitter.com/_benng)	Javascript	MIT	Yes	Partial	No
huckleberry (https://github.com/cannedprimates/huckleberry)	Jakob Sievers (https://twitter.com/cannedprimates)	Erlang				
noeleo/raft (https://github.com/noeleo/raft)	Noel Moldvai, Rohit Turumella, Josh Muhlfelder, James Butkovic (Berkeley)	Bloom	Simplified BSD	Lacking persistence	No	No
r4j (https://github.com/kaarelk/r4j)	Kaarel Kann	Java	Apache2	Yes	No	No
tetrapods/raft (https://github.com/tetrapods/raft)	Aaron Davidson (https://twitter.com/artichikin)	Java	Apache2	Yes		Yes
bakwc/PySyncObj (https://github.com/bakwc/PySyncObj)	Filipp Ozinov	Python	MIT	Yes	No	Yes
draft (https://github.com/vanstee/draft)	Patrick Van Stee (https://twitter.com/vanstee)	Elixir				
aioraft (https://github.com/lisael/aioraft)	lisael	Python	AGPL	Lacking persistence	Yes	No
mruby-flotte (https://github.com/ascaridol/mruby-flotte)	Hendrik (https://twitter.com/Asmod4n)	mruby	Apache2	Yes	No	No
lite-raft (https://github.com/nackstein/lite-raft)	Luigi Tarenga	Shell	MIT	Yes	Yes	Yes

giraft (https://github.com/vanstee/giraft)	Patrick Van Stee (https://twitter.com/vanstee)	Ruby	MIT			
benbjohnson/raft.js (https://github.com/benbjohnson/raft.js)	Ben Johnson (https://twitter.com/benbjohnson)(Sky)	Javascript	MIT			
graft (https://github.com/dev-urandom/graft)	Ben Mills (https://twitter.com/benemills) and William Dix (https://twitter.com/williamjdix) (Braintree)	Go		Partial		
dannycoates/raft-core (https://github.com/dannycoates/raft-core)	Danny Coates (https://twitter.com/antiserf)	Javascript	BSD			
rafterl (https://github.com/ericmoritz/rafterl)	Eric Moritz (https://twitter.com/ericmoritz)	Erlang				
whitewater (https://github.com/amidvidy/whitewater)	Adam Midvidy (https://twitter.com/amidvidy), Anh Mai, Karoun Kasraie, Sanketh Katta (Berkeley)	Bloom	MIT	Some correctness issues	No	No
yora (https://github.com/huy/yora)	Huy Le (https://twitter.com/lehuy20)	Ruby	MIT	Yes	Yes	
scalaraft (https://github.com/stepist/scalaraft)	Kim Je Min	Scala	Apache2			
Raft4WS (https://github.com/filipecampos/raft4ws)	Filipe Campos	Java	Apache2	Yes	No	No
seaturtles (https://github.com/lionelbarrow/seaturtles)	Lionel Barrow (https://twitter.com/LionelBarrow) (Braintree)	Go				
chelan (https://github.com/burma-shave/chelan)	Eric Jutrzenka	Scala		Yes	No	No

	(https://twitter.com/burma5have)					
bspolley/raft (https://github.com/bspolley/raft)	Alex Kaiser, Brennan Polley, Helen Weng (Berkeley)	Bloom		Some		
dinghy (https://github.com/trevorbernard/dinghy)	Trevor Bernard (https://twitter.com/trevorbernard) (UserEvents)	Clojure	Apache2			
Raft-JVM (https://github.com/tkellogg/Raft-JVM)	Tim Kellogg (https://twitter.com/kellogh) (Alteryx)	Java		No	No	No
zodiac-prime (https://github.com/evanphx/zodiac-prime)	Evan Phoenix (https://twitter.com/evanphx) (LivingSocial)	Ruby	MIT			
drpicox/uoc-raft-2013p (https://github.com/drpicox/uoc-raft-2013p)	David Rodenas (https://twitter.com/drpicox)	Java				
rodriguezvalencia/rafting (https://github.com/rodriguezvalencia/rafting)	Sergio Rodriguez	Clojure	MIT	Partial	No	No
jalvaro/raft (https://github.com/jalvaro/raft)	Jordi Alvaro	Java				
pvilas/raft (https://github.com/pvilas/raft)	Pere Vilas (https://twitter.com/perevilas)	Java				
cb372/raft (https://github.com/cb372/raft)	Chris Birchall (https://twitter.com/cbirchall)	Scala				
jpathy/raft (https://bitbucket.org/jpathy/raft)	Jiten Pathy	Go	WTFPL			

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