

[Home](#) \* [Engines](#) \* **Stockfish**



Stockfish in [Reine](#), [Lofoten](#) <sup>[4]</sup>

### **Stockfish,**

an [UCI](#) compatible [open source](#) chess engine developed by [Tord Romstad](#), [Marco Costalba](#), [Joona Kiiski](#), and [Gary Linscott](#) <sup>[1]</sup>.

Marco forked the project from version 2.1 of Tord's strong engine [Glaurung](#), first announced by Marco in November 8, 2008 <sup>[2]</sup>, and in early 2009 Joona's [Smaug](#), a further Glaurung 2.2 derivative, was incorporated <sup>[3]</sup>. Starting out among the top twenty engines, Stockfish has quickly climbed in [strength](#). The name "Stockfish" reflects the ancestry of the engine. Tord is Norwegian and Marco Italian, and there is a long history of [stockfish](#) trade from Norway to Italy (to Marco's home town of [Vicenza](#), in fact). Stockfish also references another famous "little fish", [Rybka](#).

## **Table of Contents**

[Science versus Commerce?](#)

[Fishtest](#)

[Evaluation Guide](#)

[Tournament Play](#)

[GM+Rybka vs. Stockfish](#)

[Selected Features](#)

[Board Representation](#)

[Search](#)

[Evaluation](#)

[Misc](#)

[Release Dates](#)

[Ports](#)

[Derivatives](#)

[See also](#)

[Publications](#)

[Videos](#)

[Forum Posts](#)

[2008](#)

[2009](#)

[2010](#)

[2011](#)

[2012](#)

[2013](#)

[2014](#)

[2015](#)

[2016](#)

[2017](#)

[2018](#)

[External Links](#)

[Chess engine](#)

[Rating Lists](#)

[Matches](#)

[Interviews](#)

[Misc](#)

[References](#)

[What links here?](#)

## Science versus Commerce?

There is a wide range of opinions about strong open source chess engines affecting commercial and competitive interests, as well as monetary interests from computer chess users, who obtain a top engine for free. The scientific and social value of strong open source programs is indisputable. The [teamwork](#) effort to share ideas and knowledge to write one of the strongest programs, which everybody may follow and share to learn and play for free, is definitely a challenging and motivating task, gathering both admiration and enviousness. Obviously, professional programmers of commercial chess programs are not that enthusiastic about the development, and need to improve further and/or focus more on secondary features or other business concepts like on-line play and/or [user interface](#) issues rather than on pure playing strength.

Also many hobbyist chess programmers feel in antagonism as well, not only caused by Stockfish with its highly respected authors, and before by [Fruit](#) and slightly [Crafty](#), but from [Ippolit](#) and all its successors by pseudonymous authors and disputed origin. The implications on commercial and competitive computer chess are not quite clear, but presumably the decrease in number of participants of over the board [tournaments](#) will progress and [clone](#) suspicions may float like a [Sword of Damocles](#) over the scene, whether programmers took ideas too literally or not.

## Fishtest

The Stockfish Testing Framework called **Fishtest** <sup>[5]</sup> is a web application written by [Gary Linscott](#) <sup>[6]</sup> <sup>[7]</sup> mainly in [Python](#) under the *Pyramid Application Development Framework* <sup>[8]</sup>, to distribute games across different machines to reduce the test latency and increment throughput. Started in early 2013 with Stockfish 3.0, Fishtest has hundreds of contributors, as of May 2014, 744 testers and 52 developers <sup>[9]</sup> active in testing ideas and tweaks <sup>[10]</sup>, to make Stockfish the strongest open source or even chess program of the world <sup>[11]</sup>.

## Evaluation Guide

Since April 2017 the interactive **Stockfish Evaluation Guide** is available to explore Stockfish's [evaluation](#) with a [JavaScript](#) implementation running in a [browser](#) <sup>[12]</sup>. One may enter a [FEN](#) string of a [position](#), to get the resulting [score](#) of the main evaluation term considering the [game phases](#) within its [tapered evaluation](#), and may navigate through the tree of subterms and features with its particular characteristics for the given position <sup>[13]</sup>.

## Tournament Play

Stockfish is top contender of the prestigious [Thoresen Chess Engines Competition \(TCEC\)](#), reaching the superfinals since [season 4](#), losing season 4 from [Houdini](#) and season 5 from [Komodo TCEC](#), both narrow matches with 23 - 25, but won the [season 6 superfinal](#) versus [Komodo 7](#) conveniently with +13=45-6 and 35½ - 28½. Successor [Stockfish 141214](#) qualified for the [TCEC Season 7 Superfinal](#) in December 2014, versus Komodo again, this time with the better end for [Komodo 8](#) successor 1333 with 33½ - 30½. About one year later at [TCEC Season 8](#), again Komodo and Stockfish qualified for the [TCEC Season 8 Superfinal](#), finished with 53½ - 46½ in favour to [Komodo 9.3x](#) <sup>[14]</sup>, but in the [following year](#) **Stockfish 8** won the [superfinal](#) conveniently this time versus the new [Houdini 5](#) with **54½ - 45½**.

.

## GM+Rybka vs. Stockfish

On July 19, 2014, Stockfish 5 played a four game match versus [Daniel Naroditsky](#) plus [Rybka 3](#) (2008), 45 minutes plus 30-second increment. Stockfish won 3½ - ½ <sup>[15]</sup> <sup>[16]</sup>. A few weeks later the experiment continued with [Hikaru Nakamura](#) in [Burlingame, California](#) <sup>[17]</sup>. Supported two games by Rybka 3, Nakamura lost ½ - 1½, two games with pawn odds (Stockfish both Black without h- and b-pawn) ended ½ - 1½ in favour to Stockfish 5 as well. It played the latest development build compiled for [OS X](#) running on a 3 GHz 8-Core [Mac Pro](#) <sup>[18]</sup>.

## Selected Features

<sup>[19]</sup>

### [Board Representation](#)

- [Bitboards](#) with [Little-Endian Rank-File Mapping \(LERF\)](#)
- [Magic Bitboards](#)  
[BMI2 - PEXT Bitboards](#) (not recommend for [AMD Ryzen](#) <sup>[20]</sup>)

- [Piece-Lists](#)

## Search

- [Iterative Deepening](#)
- [Aspiration Windows](#)
- [Parallel Search](#) using [Threads](#)
  - [YBWC](#) prior to Stockfish 7
  - [Lazy SMP](#) since Stockfish 7, January 2016
- [Principal Variation Search](#)
- [Transposition Table](#)
  - [Shared Hash Table](#)
  - 10 [Bytes](#) per [Entry](#), 3 Entries per [Cluster](#)
  - [Depth-preferred Replacement Strategy](#)
  - No [PV-Node](#) probing
  - [Prefetch](#)
- [Move Ordering](#)
  - [Countermove Heuristic](#)
  - [Counter Moves History](#) since Stockfish 7, January 2016 <sup>[21]</sup>
  - [History Heuristic](#)
  - [Internal Iterative Deepening](#)
  - [Killer Heuristic](#)
  - [MVV/LVA](#)
  - [SEE](#)
- [Selectivity](#)
  - [Extensions](#)
    - [Check Extensions](#) if [SEE](#)  $\geq 0$
    - [Restricted Singular Extensions](#)
  - [Pruning](#)
    - [Futility Pruning](#)
    - [Move Count Based Pruning](#)
    - [Null Move Pruning](#)
      - [Dynamic Depth Reduction](#) based on [depth](#) and [value](#)
      - [Static Null Move Pruning](#)
      - [Verification search](#) at high depths
    - [ProbCut](#)
    - [SEE Pruning](#)
  - [Reductions](#)
    - [Late Move Reductions](#)
    - [Razoring](#)
  - [Quiescence Search](#)

## Evaluation

[\[22\]](#) [\[23\]](#)

- [Tapered Eval](#)
- [Score Grain](#): ~1/256 of a [pawn unit](#)
- [Material](#)
  - [Point Values](#)
    - [Midgame](#): 198, 817, 836, 1270, 2521
    - [Endgame](#): 258, 846, 857, 1278, 2558
  - [Bishop Pair](#)
  - [Imbalance Tables](#)
  - [Material Hash Table](#)
- [Piece-Square Tables](#)
- [Space](#)
- [Mobility](#)
  - [Trapped Pieces](#)
  - [Rooks on \(Semi\) Open Files](#)
- [Outposts](#)
- [Pawn Structure](#)
  - [Pawn Hash Table](#)
  - [Backward Pawn](#)
  - [Doubled Pawn](#)
  - [Isolated Pawn](#)
  - [Phalanx](#)
  - [Passed Pawn](#)
- [King Safety](#)
  - [Attacking King Zone](#)
  - [Pawn Shelter](#)
  - [Pawn Storm](#)
  - [Square Control](#)
- [Evaluation Patterns](#)

## Misc

- [Chess960](#)
- [Stockfish's Tuning Method](#)  
[SPSA](#)
- [Syzygy Bases](#)

## Release Dates

- Stockfish 1.0 : November 02, 2008
- Stockfish 1.01 : November 03, 2008
- Stockfish 1.1 : December 06, 2008
- Stockfish 1.1a : December 08, 2008

- Stockfish 1.2 : December 29, 2008
- Stockfish 1.3 : May 02, 2009
- Stockfish 1.3.1 : May 03, 2009
- Stockfish 1.4 : July 05, 2009
- Stockfish 1.5 : October 04, 2009
- Stockfish 1.5.1 : October 11, 2009
- Stockfish 1.6 : December 25, 2009
- Stockfish 1.6.1 : December 25, 2009
- Stockfish 1.6.2 : December 31, 2009
- Stockfish 1.6.3 : February 02, 2010
- Stockfish 1.7 : April 08, 2010
- Stockfish 1.7.1 : April 10, 2010
- Stockfish 1.8 : July 02, 2010
- Stockfish 1.9 : October 02, 2010
- Stockfish 1.9.1 : October 05, 2010
- Stockfish 2.0 : January 01, 2011
- Stockfish 2.0.1 : January 04, 2011
- Stockfish 2.1 : May 04, 2011
- Stockfish 2.1.1 : May 08, 2011
- Stockfish 2.2 : December 29, 2011
- Stockfish 2.2.1 : January 06, 2012
- Stockfish 2.2.2 : January 14, 2012
- Stockfish 2.3 : September 15, 2012
- Stockfish 2.3.1 : September 22, 2012
- Stockfish 3 : April 30, 2013
- Stockfish 4 : August 20, 2013
- Stockfish DD : November 29, 2013
- Stockfish 5 : May 31, 2014
- Stockfish 6 : January 27, 2015
- Stockfish 7 : January 02, 2016
- Stockfish 8 : November 01, 2016
- Stockfish 9 : February 01, 2018

## Ports

- [asmFish](#)
- [CFish](#)
- [DroidFish](#)
- [Portfish](#)
- [Stockfish-js](#) <sup>[24]</sup>

## Derivatives

- [Brainfish](#)
- [McBrain](#)

- [DON](#)
- [Sting](#)
- [SugaR](#)

## See also

- [Evaluation Philosophy](#)
- [Fish](#)
- [Food](#)
- [Glaurung](#)
- [LCZero](#)
- [Raspberry Turk](#)

## Publications

- [Arno Nickel](#) (2012). [Die schöne neue Welt der Schachengines](#). [SCHACH](#) 2,3,5,6 2012, [pdf](#) (German) <sup>[25]</sup>
- [Oleg Arenz](#) (2012). *Monte Carlo Chess*. B.Sc. thesis, [Darmstadt University of Technology](#), advisor [Johannes Fürnkranz](#), [pdf](#) » [Monte-Carlo Tree Search](#)
- [Tamal T. Biswas](#), [Kenneth W. Regan](#) (2015). *Quantifying Depth and Complexity of Thinking and Knowledge*. [ICAART 2015](#), [pdf](#)
- [Tamal T. Biswas](#), [Kenneth W. Regan](#) (2015). *Measuring Level-K Reasoning, Satisficing, and Human Error in Game-Play Data*. [IEEE ICMLA 2015](#), [pdf preprint](#)
- [Shu Yokoyama](#), [Tomoyuki Kaneko](#), [Tetsuro Tanaka](#) (2015). *Parameter-Free Tree Style Pipeline in Asynchronous Parallel Game-Tree Search*. [Advances in Computer Games 14](#) , [pdf](#) » [P-GPP](#)
- [Jean-Marc Alliot](#) (2017). *Who is the Master?* [ICGA Journal](#), Vol. 39, No. 1, [draft as pdf](#) <sup>[26]</sup>

## Videos

- [How do modern chess engines work? | Video](#), Talk by [Daylen Yang](#), [TNG | Big Techday 8](#), June 12, 2015
- [Parallelism and Selectivity in Game Tree Search | Video](#), Talk by [Tord Romstad](#), [TNG | Big Techday 8](#), June 12, 2015

## Forum Posts

### 2008

- [Stockfish 1.0](#) by [Marco Costalba](#), [CCC](#), November 02, 2008
- [Please drop Stockfish](#) by [Marco Costalba](#), [CCC](#), November 07, 2008

### 2009



- [Re: Stockfish - Glaurung](#) by [Tord Romstad](#), [WBEC-Ridderkerk forum](#), September 05, 2009
- [Stockfish 1.5.1](#) by [Marco Costalba](#), [CCC](#), October 08, 2009

## 2010

- [Stockfish 1.7](#) by [Marco Costalba](#), [CCC](#), April 08, 2010
- [Stockfish-1.7.0 Hyper-threading Detection](#) by [Louis Zulli](#), [CCC](#), April 09, 2010 » [Thread](#)
- [stockfish fail high fail low](#) by [Uri Blass](#), [CCC](#), April 13, 2010
- [MTD experiment with stockfish 1.7.1](#) by [Vratko Polák](#), [CCC](#), April 15, 2010
- [about stockfish and logic](#) by [Uri Blass](#), [CCC](#), April 17, 2010
- [Stockfish - material balance/imbalance evaluation](#) by [Ralph Stoesser](#), [CCC](#), May 05, 2010
- [Qsearch of Stockfish 1.7.1](#) by [Ferdinand Mosca](#), [CCC](#), May 13, 2010
- [Stockfish do\\_move + undo\\_move](#) by [Matthew Purland](#), [CCC](#), June 02, 2010
- [static null move pruning is stockfish](#) by [Tom King](#), [CCC](#), June 13, 2010
- [Stockfish - single evasion extensions](#) by [Ralph Stoesser](#), [CCC](#), June 27, 2010
- [Stockfish 1.8 JA available](#) by [Jim Ablett](#), [CCC](#), July 02, 2010
- [stockfish 1.8 - Eval hash gone?](#) by [Edward Yu](#), [CCC](#), July 04, 2010
- [Stockfish Singular Extension, does it make sense?](#) by [Volker Böhm](#), [CCC](#), July 08, 2010
- [Stockfish 1.8 tweaks](#) by [Vratko Polák](#), [CCC](#), July 09, 2010
- [Stockfish question](#) by [Rebel](#), [OpenChess Programming Forum](#), July 10, 2010
- [Taken from CCC \(Stockfish & mainlines\)](#) by [Rebel](#), [OpenChess Programming Forum](#), July 12, 2010
- [backward pawns in Stockfish](#) by [Marek Kwiatkowski](#), [CCC](#), July 16, 2010
- [Questions for the Stockfish team](#) by [Michael Sherwin](#), [CCC](#), July 16, 2010
- [Stockfish 1.8 - eval cache](#) by [Ralph Stoesser](#), [CCC](#), July 18, 2010 » [Evaluation Hash Table](#)
- [Stockfish null move pre-condition](#) by [Rein Halbersma](#), [CCC](#), July 22, 2010 » [Null Move Pruning](#)
- [Stockfish for 39 dollars](#) by [Matthias Gemuh](#), [CCC](#), August 26, 2010
- [Stockfish 1.9 JA update available](#) by [Jim Ablett](#), [CCC](#), October 02, 2010
- [mobility evaluation of stockfish](#) by [Uri Blass](#), [CCC](#), October 09, 2010

## 2011

- [Stockfish 2.0 Available](#) by [Jim Ablett](#), [CCC](#), January 01, 2011
- [Stockfish 2.0.0 tests](#) by [Harun Taner](#), [CCC](#), January 04, 2011
- [Stockfish "Use Sleeping Threads" Test](#) by [Louis Zulli](#), [CCC](#), January 05, 2011
- [Stockfish engine](#) by [Andriy Dzyben](#), [CCC](#), January 11, 2011
- [Designing an analysis friendly Stockfish?](#) by [Uly](#), [Open Chess Programming Forum](#), January 28, 2011
- [Why are the Ippo derivative stronger than Stockfish?](#) by [Larry Kaufman](#), [CCC](#), 24 February, 2011
- [Transposition Table updates in Stockfish](#) by [Onno Garms](#), [CCC](#), April 12, 2011 » [Transposition Table](#)
- [Stockfish random generator \(rkiss.h\)](#) by [Martin Sedlak](#), [CCC](#), Apr 15, 2011 » [Bob Jenkins](#)
- [futility pruning in stockfish](#) by [Engin Üstün](#), [CCC](#), May 25, 2011 » [Futility Pruning](#)
- [Stockfish clones in the AppStore: it's becoming a plague...](#) by [Julien Marcel](#), [CCC](#), May 28, 2011 » [Clones](#)

- [Root node search in Stockfish](#) by [Onno Garms](#), [CCC](#), June 12, 2011 » [Move Ordering](#), [Root](#)
- [Grandmaster prefers Stockfish evals](#) by [Albert Silver](#), [CCC](#), September 29, 2011
- [Stockfish on github](#) by [Marco Costalba](#), [CCC](#), October 02, 2011
- [Stockfish's tuning method](#) by [Joona Kiiski](#), [CCC](#), October 07, 2011 » [Stockfish's Tuning Method](#)

## 2012

- [StockFish LS with LimitStrength feature](#) by [Alexander Schmidt](#), [CCC](#), January 01, 2012
- [Stockfish Code \( Piece Value's\)](#) by Nolan Denson, [CCC](#), January 10, 2012 » [Point Value](#)
- [Stockfish hash implementation](#) by [Jon Dart](#), [CCC](#), January 10, 2012 » [Transposition Table](#)
- [Stockfish 2.2.2 JA update available](#) by [Jim Ablett](#), [CCC](#), January 14, 2012
- [CLOP on Stockfish](#) by [Gary](#), [CCC](#), March 10, 2012 » [CLOP](#)
- [optimal aspiration window for stockfish question](#) by [Uri Blass](#), [CCC](#), March 12, 2012 » [Aspiration Windows](#)
- [Raspberry Pi / Stockfish dedicated chess computer/board](#) by [Jean-Francois Romang](#), [CCC](#), August 26, 2012 » [Raspberry Pi, Dedicated Chess Computers](#)
- [Stockfish 2.3 update available](#) by [Jim Ablett](#), [CCC](#), September 15, 2012

## 2013

- [10 Lessons to be Learned from todays Top Engines](#) by Josef, [Rybka Forum](#), January 03, 2013 » [Houdini](#), [Komodo](#)
- [Stockfish 3 Official JA Windows/Linux builds available](#) by [Jim Ablett](#), [CCC](#), April 30, 2013
- [Fishtest Distributed Testing Framework](#) by [Marco Costalba](#), [CCC](#), May 01, 2013 » [Fishtest](#)
- [Re: History pruning / move ordering question](#) by [Joona Kiiski](#), [CCC](#), May 12, 2013 » [Countermove Heuristic](#)
- [Stockfish 3 PA GTB](#) by [Jeremy Bernstein](#), [OpenChess Forum](#), May 15, 2013
- [Probcut](#) by [Gary](#), [CCC](#), May 24, 2013 » [ProbCut](#)
- [Stockfish bug](#) by [Steven Atkinson](#), [CCC](#), May 30, 2013 » [Repetitions](#)
- [The Ultimate Stockfish!](#) by [Mike Scheidl](#), [CCC](#), July 09, 2013
- [use sleeping threads](#) by [Don Dailey](#), [CCC](#), July 10, 2013 » [Parallel Search](#), [Thread](#)
- [Stockfish 4](#) by [Marco Costalba](#), [CCC](#), August 20, 2013
- [18 days from SF4 release and about ~30+ ELO gain!](#) by Alexandre Meirelles Souza, [CCC](#), September 08, 2013
- [How much of Stockfish code is still from Tord Romstad?](#) by [Jouni Uski](#), [CCC](#), September 16, 2013
- [Syzygy tablebases, work in Stockfish?](#) by [Jose Mº Velasco](#), [CCC](#), September 23, 2013 » [Syzygy Bases](#)
- [Stockfish search](#) by [Harm Geert Muller](#), [CCC](#), October 28, 2013 » [Principal variation](#)
- [Some food for thought](#) by [Spacious Mind](#), [Hiarcs Forum](#), November 11, 2013 » [Stockfish](#) vs. [Tasc CM32 512K The King 2.2](#)
- [Stockfish scaling](#) by [Ed Schröder](#), [CCC](#), November 15, 2013
- [Stockfish depth vs. others: challenge](#) by [Larry Kaufman](#), [CCC](#), November 24, 2013 » [Depth](#)
- [Stockfish DD: a new official release](#) by [Marco Costalba](#), [CCC](#), November 29, 2013 » [TCEC Season 5](#), dedicated to [Don Dailey](#)

- [Stockfish Syzygy: how to interpret mates?](#) by [Jouni Uski](#), [CCC](#), December 01, 2013 » [Syzygy Bases](#), [Mate Scores](#)
- [Is SF DD greater efficiency would be null move pruning?](#) by Jonathan Lee, [CCC](#), December 22, 2013 » [Null Move Pruning](#)

## 2014

- [Help me to test an idea for Stockfish](#) by Robert Tournevisse, [CCC](#), January 03, 2014 » [Piece-Square Tables](#), [Tapered Eval](#)
- [Stockfish seems definitely the strongest engine](#) by [Kai Laskos](#), [CCC](#), January 21, 2014
- [Stockfish Mac app](#) by [Daylen Yang](#), [CCC](#), January 22, 2014 » [Macintosh](#)
- [Stockfish goes EGBB](#) by [Daniel Shawul](#), [CCC](#), January 29, 2014 » [Scorpio Bitbases](#)
- [fixing the null move search "bug"](#) by [Uri Blass](#), [CCC](#), February 01, 2014 » [Null Move Pruning](#)
- [Disabling Null Move Pruning in Stockfish](#) by [Louis Zulli](#), [CCC](#), February 15, 2014 » [Null Move Pruning](#)
- [Threads-Test](#) by [Andreas Strangmüller](#), [CCC](#), March 18, 2014 » [Thread](#), [Parallel Search](#)
- [Stockfish haswell optimized build](#) by [Jean-Francois Romang](#), [CCC](#), April 06, 2014 » [BMI2](#)
- [Huge simplification](#) by [Lyudmil Tsvetkov](#), [CCC](#), April 25, 2014 » [Pawn chain](#)
- [Stockfish zero evals](#) by [Larry Kaufman](#), [CCC](#), May 02, 2014
- [Threads-Test - SF, Zappa, Komodo - 1 vs. 2, 4, 8, 16 Threads](#) by [Andreas Strangmüller](#), [CCC](#), May 04, 2014 » [Thread](#), [Stockfish](#), [Zappa](#), [Komodo](#)
- [investigating why stockfish is strong idea](#) by [Uri Blass](#), [CCC](#), May 05, 2014
- [Threads factor: Komodo, Houdini, Stockfish and Zappa](#) by [Andreas Strangmüller](#), [CCC](#), May 17, 2014 » [Komodo](#), [Houdini](#), [Stockfish](#), [Zappa](#)
- [Goodbye CLOP, hello SPSA](#) by [Gary Linscott](#), [FishCooking](#), May 17, 2014 » [CLOP](#), [SPSA](#)
- [Stockfish 5](#) by [Marco Costalba](#), [CCC](#), May 31, 2014
- [Stockfish Status Report](#) by [Louis Zulli](#), [CCC](#), June 27, 2014
- [GM and Rybka vs. Stockfish](#) by Robert Maddox, [CCC](#), August 09, 2014 » [GM+Rybka vs. Stockfish](#)
- [Nakamura vs Stockfish, public match 8/23](#) by Jesse L, [CCC](#), August 17, 2014
- [Using the Stockfish position evaluation score to predict victory probability](#) by unavoidablegrain, [Tumblr](#), September 28, 2014 » [Pawn Advantage](#), [Win Percentage](#), and [Elo](#)
- [Threads test incl. Stockfish 5 and Komodo 8](#) by [Andreas Strangmüller](#), [CCC](#), October 09, 2014
- [Threads test - Stockfish 5 against Komodo 8](#) by [Andreas Strangmüller](#), [CCC](#), October 10, 2014 » [Thread](#), [Parallel Search](#), [Stockfish](#), [Komodo](#)
- [Stockfish and accurate PV](#) by [Matthew Lai](#), [CCC](#), December 25, 2014 » [Principal variation](#)
- [Stockfish 32-bit and hardware instructions on MSVC++](#) by [Syed Fahad](#), [CCC](#), December 30, 2014 » [BitScan](#), [Population Count](#)

## 2015

- [Stockfish in Lozza UIs](#) by [Colin Jenkins](#), [CCC](#), January 07, 2015 » [Lozza](#), [Stockfish-js](#) <sup>[27]</sup>
- [SF6 has been released](#) by [Joona Kiiski](#), [CCC](#), January 27, 2015
- [Stockfish 6 is impressive in Behting study](#) by [Jouni Uski](#), [CCC](#), January 31, 2015 » [Behting Study](#)
- [Stockfish with 16 threads - big news?](#) by [Louis Zulli](#), [CCC](#), February 15, 2015 » [Thread](#)

- [Explanation for non-expert?](#) by [Louis Zulli](#), [CCC](#), February 16, 2015 » [Parallel Search](#)
- [Stockfish still scales poorly?](#) by [Louis Zulli](#), [CCC](#), February 20, 2015
- [Measuring SF idle time](#) by [Louis Zulli](#), [CCC](#), February 21, 2015
- [Better NPS scaling for Stockfish](#) by [Louis Zulli](#), [CCC](#), February 27, 2015
- [Stockfish Questions](#) by [Syed Fahad](#), [CCC](#), February 28, 2015
- [Best Stockfish NPS scaling yet](#) by [Louis Zulli](#), [CCC](#), March 02, 2015
- [Stockfish contempt factor](#) by [Kai Laskos](#), [CCC](#), March 10, 2015 » [Contempt Factor](#)
- [Improving SF passer code](#) by [Lyudmil Tsvetkov](#), [CCC](#), March 26, 2015 » [Connected Passed Pawns](#)
- [Problem with SF6 and Syzygy TB](#) by [Forrest Hoch](#), [CCC](#), April 01, 2015 » [Syzygy Bases](#)
- [Empirical results with Lazy SMP, YBWC, DTS](#) by [Kai Laskos](#), [CCC](#), April 16, 2015 » [Lazy SMP](#), [YBWC](#), [DTS](#)
- [The effective speedup from 1 to 8 cpus for SF and Komodo](#) by [Adam Hair](#), [CCC](#), May 31, 2015 » [Parallel Search](#), [Komodo](#)
- [New Stockfish with Lazy SMP, but what about the TC bug ?](#) by [Ernest Bonnem](#), [CCC](#), October 26, 2015 » [Parallel Search](#), [TCEC Season 8](#)
- [Binary for TCEC superfinal](#) by [Kiran Panditrao](#), [FishCooking](#), October 30, 2015 » [TCEC Season 8](#)
- [SF binaries for TCEC superfinal](#) by [Marco Costalba](#), [CCC](#), October 31, 2015
- [Stockfish dev 091115 for ANDROID](#) by [Nathanael Russell](#), [CCC](#), November 09, 2015 » [Android](#)
- [Stockfish now benefits from hyperthreading](#) by [Dmitri Gusev](#), [CCC](#), November 12, 2015 » [Thread](#)
- [Stockfish 7 beta 1](#) by [Joona Kiiski](#), [CCC](#), December 27, 2015
- [Another GHI example in SF \(maybe\)](#) by [BB+](#), [OpenChess Forum](#), December 30, 2015 » [Graph History Interaction](#)

## 2016

- [Stockfish 7](#) by [Joona Kiiski](#), [CCC](#), January 02, 2016
- [Threads test incl. Stockfish 7](#) by [Andreas Strangmüller](#), [CCC](#), January 11, 2016 » [Thread](#), [Parallel Search](#)
- [Stockfish 7 progress](#) by [Carl Lumma](#), [CCC](#), January 16, 2016
- [Oddity around depths 7-8 with Stockfish 6 & 7](#) by [Ken Regan](#), [CCC](#), January 21, 2016
- [Stockfish 7 and partial 6 piece syzygy problem?](#) by [Jouni Uski](#), [CCC](#), March 01, 2016
- [Re: Stockfish 7 and partial 6 piece syzygy problem?](#) by [Marco Costalba](#), [CCC](#), September 01, 2016
- [Computer Chess Progress: Stockfish 7 vs Ruffian 1.0.5](#) by [Martin Fierz](#), [CCC](#), March 17, 2016 » [Ruffian](#)
- [Natural TB](#) by [Marco Costalba](#), [CCC](#), May 29, 2016 » [Syzygy Bases](#)
- [Stockfish eval output](#) by [Erin Dame](#), [CCC](#), August 27, 2016 » [Wrong color Bishop and rook pawn](#)
- [Re: Beginner's guide to graphical profiling](#) by [Marco Costalba](#), [CCC](#), September 10, 2016 » [Profiling](#)
- [ELO inflation ha ha ha](#) by [Henk van den Belt](#), [CCC](#), September 16, 2016 » [Delphil](#), [Match Statistics](#), [Playing Strength](#), [TCEC Season 9](#) <sup>[281]</sup>
- [Stockfish underpromotes much more often than Komodo](#) by [Kai Laskos](#), [CCC](#), October 05, 2016 » [Komodo](#), [Match Statistics](#), [Promotions](#)
- [couple of questions about stockfish code ?](#) by [Mahmoud Uthman](#), [CCC](#), October 26, 2016 » [SIMD and SWAR Techniques](#), [Tapered Eval](#)
- [Stockfish 8](#) by [Marco Costalba](#), [FishCooking](#), November 01, 2016

- [Stockfish 8 official](#) by [Marco Costalba](#), [CCC](#), November 01, 2016
- [NUMA test compilation](#) by Joachim Müller, [FishCooking](#), November 05, 2016 » [NUMA](#)
- [Stockfish 8 - Double time control vs. 2 threads](#) by [Andreas Strangmüller](#), [CCC](#), November 15, 2016 » [Doubling TC](#), [Diminishing Returns](#), [Playing Strength](#), [Lazy SMP](#)
- [Stockfish benchmark data](#) by [Adam Hair](#), [OpenChess Forum](#), November 27, 2016
- [The new chess rules \(5-fold repetition and 75-move draw\)](#) by [Lyudmil Antonov](#), [FishCooking](#), November 29, 2016 » [Repetitions](#), [Fifty-move Rule](#)
- [Scoutfish: powerful chess query tool](#) by [Marco Costalba](#), [CCC](#), December 11, 2016 » [Databases](#), [Portable Game Notation](#), [Scoutfish](#)

## 2017

- [SF Progression since Fishtest inception](#) by [Adam Hair](#), [CCC](#), January 14, 2017 » [Fishtest](#)
- [Re: Chessprograms with the most chessknowing](#) by [Marco Costalba](#), [CCC](#), February 19, 2017 » [Search versus Evaluation](#)
- [Symmetric multiprocessing \(SMP\) scaling - SF8 and K10.4](#) by [Andreas Strangmüller](#), [CCC](#), May 05, 2017 » [Lazy SMP](#), [Komodo](#)
- [Symmetric multiprocessing \(SMP\) scaling - SF8 Contempt=10](#) by [Andreas Strangmüller](#), [CCC](#), May 13, 2017 » [SMP](#), [Contempt Factor](#)
- [Stockfish version with hash saving capability](#) by [Daniel José Queralto](#), [CCC](#), July 25, 2017 » [Persistent Hash Table](#)
- [Natural TB \(take 2\)](#) by [Marco Costalba](#), [CCC](#), August 22, 2017 » [Syzygy Bases](#)
- [Approximating Stockfish's Evaluation by PSQTs](#) by [Thomas Dybdahl Ahle](#), [CCC](#), August 23, 2017 » [Regression](#), [Piece-Square Tables](#)
- [Stockfish no progress in 2month and half , why ?](#) by Jean Baptiste, [CCC](#), August 28, 2017
- [Stockfish testing at STC and LTC: one question](#) by [Jouni Uski](#), [CCC](#), September 19, 2017
- [Scaling from FGRL results with top 3 engines](#) by [Kai Laskos](#), [CCC](#), September 26, 2017 » [FGRL](#), [Houdini](#), [Komodo](#)
- [AlphaZero vs Stockfish](#) by Bigler, [CCC](#), December 06, 2017 » [AlphaZero vs. Stockfish](#)
- [A branch to test the Monte Carlo algorithm in Stockfish](#) by Stephane Nicolet, [FishCooking](#), December 06, 2017 » [Monte-Carlo Tree Search](#), [AlphaZero](#)
- [Reactions about AlphaZero from top GMs...](#) by [Norman Schmidt](#), [CCC](#), December 08, 2017 » [AlphaZero: Reactions From Top GMs](#), [Stockfish Author](#), [Tord Romstad](#)
- [MCTS wrapper for StockFish](#) by [Jonathan Baxter](#), [FishCooking](#), December 19, 2017 » [Monte-Carlo Tree Search](#)

## 2018

- [Stockfish 8 - Initial position until depth 59](#) by [Andreas Strangmüller](#), [CCC](#), January 16, 2018 » [Initial Position](#)
- [New Stockfish contempt](#) by [Jouni Uski](#), [CCC](#), January 29, 2018 » [Contempt Factor](#)
- [Stockfish 9](#) by [Marco Costalba](#), [CCC](#), February 01, 2018
- [Elo measurement of contempt in SF in self-play](#) by [Michel Van den Bergh](#), [CCC](#), March 10, 2018 » [Contempt](#), [Playing Strength](#)
- [Stockfish 180113 - Initial position until depth 65](#) by [Andreas Strangmüller](#), [CCC](#), March 27, 2018

» [Initial Position](#)

## External Links

### Chess engine

- [Stockfish Chess Engine Home](#)
- [Stockfish Blog](#)
- [Get Involved - Stockfish - Powerful Open Source Chess Engine](#)  
[Stockfish Testing Framework](#) » [Fishtest](#)  
[Stockfish Evaluation Guide](#) » [Stockfish Evaluation Guide](#)
- [FishCooking - Google Groups](#) a discussion group for developers and testers of [Stockfish](#) chess engine
- [Welcome - Stockfish Support](#)
- [official-stockfish/Stockfish · GitHub](#)
- [zamar · GitHub](#) by [Joona Kiiski](#)  
[SPSA Tuner for Stockfish Chess Engine](#) » [SPSA](#)
- [Stockfish Development Versions](#) hosted by [Roman Korba](#)
- [Stockfish Development Versions for macOS](#)
- [stockfishchess](#) on [Twitter](#)
- [Stockfish \(chess\)](#) from Wikipedia
- [Arduino & Raspberry PI Chess Computer](#) running [Stockfish](#) on [Raspberry Pi](#), by [Max Dobres](#) » [Arduino](#), [Sensory Board](#)
- [One chess champion per laptop](#) by [Roberto Perez-Franco](#), [MIT's The Tech](#), January 15, 2014 » [TCEC Season 5](#)
- [And then there were two](#) by [John Hartmann](#), [ChessBase News](#), June 09, 2015 » [Komodo](#), [Stockfish](#)
- [Depth of Satisficing](#) by [Ken Regan](#), [Gödel's Lost Letter and P=NP](#), October 06, 2015 » [Depth](#), [Match Statistics](#), [Pawn Advantage](#), [Win Percentage](#), and [ELO](#), [Stockfish](#), [Komodo](#) <sup>[29]</sup>
- [A Chess Firewall at Zero?](#) by [Ken Regan](#), [Gödel's Lost Letter and P=NP](#), January 21, 2016
- [Adam's Computer Chess Pages: Stockfish Progression](#) by [Adam Hair](#) » [Fishtest](#)

### Rating Lists

- [Stockfish](#) from [CCRL 40/40](#)
- [Stockfish 5 64-bit 4CPU](#) in [CCRL 40/4](#)

### Matches

- [Can a GM and Rybka beat Stockfish?](#) by GM [Daniel Naroditsky](#), [Chess.com](#), August 08, 2014 » [GM+Rybka vs. Stockfish](#)
- [Stockfish Outlasts "Rybkamura"](#) by [FM Mike Klein](#), [Chess.com](#), August 24, 2014
- [AlphaZero: Reactions From Top GMs, Stockfish Author](#) by [Peter Doggers](#), [Chess.com](#), December 08, 2017 » [AlphaZero vs. Stockfish](#)



## Interviews

- [Computerschach, Interview with Tord Romstad \(Norway\), Joona Kiiski \(Finland\) and Marco Costalba \(Italy\)](#) by [Frank Quisinsky](#), March 29, 2010
- [Stockfish 4 to play in the new season of TCEC | Chessdom - Short interview with the Stockfish team](#), August 22, 2013 » [TCEC](#), [TCEC Season 5](#)

## Misc

- [Stockfish from Wikipedia](#)
- [Lofoten Stockfish Museum from Wikipedia](#)
- [Stockfish](#) from [Norsk Fiskeværmuseum, Å, Moskenes](#)
- [Postcards from the Lofoten Islands](#) from [Giving Up The Ghost](#), May 29, 2012 » [Stockfish](#) and [Gulls](#)

## References

1. ^ [Stockfish 7](#) by [Joona Kiiski](#), [CCC](#), January 02, 2016
2. ^ [Stockfish 1.0](#) by [Marco Costalba](#), [CCC](#), November 02, 2008
3. ^ [Re: Smaug: a new chess engine based on glaurung](#) by [Marco Costalba](#), [CCC](#), March 12, 2009
4. ^ [Lofoten - Seeing is believing - The fisheries](#)
5. ^ [glinscott/fishtest · GitHub](#)
6. ^ [Get Involved - Stockfish - Powerful Open Source Chess Engine](#)
7. ^ [Fishtest Distributed Testing Framework](#) by [Marco Costalba](#), [CCC](#), May 01, 2013
8. ^ [The Pyramid Web Framework — The Pyramid Web Framework v1.5](#)
9. ^ [Stockfish Testing Framework - Users](#)
10. ^ [Stockfish Testing Framework](#)
11. ^ [Adam's Computer Chess Pages: Stockfish Progression](#) by [Adam Hair](#)
12. ^ [Re: How far away are we from deep learning Stockfish, Komodo](#) by [Gary](#), [CCC](#), May 21, 2017
13. ^ [Stockfish Evaluation Guide](#)
14. ^ [Soccer-like chess](#) by [Marco Costalba](#), [CCC](#), November 29, 2015
15. ^ [Can a GM and Rybka beat Stockfish?](#) by GM [Daniel Naroditsky](#), [Chess.com](#), August 08, 2014
16. ^ [GM and Rybka vs. Stockfish](#) by Robert Maddox, [CCC](#), August 09, 2014
17. ^ [Nakamura vs Stockfish, public match 8/23](#) by Jesse L, [CCC](#), August 17, 2014
18. ^ [Stockfish Outlasts "Rybka" vs. Komodo](#) by [FM Mike Klein](#), [Chess.com](#), August 24, 2014
19. ^ based on the sources of Stockfish 6
20. ^ [Ryzen and BMI2: Strange behavior and high latencies](#) by DonnieTinyHands, [Reddit](#), March 20, 2017
21. ^ [Re: Stockfish 7 progress](#) by Lucas Braesch, [CCC](#), January 17, 2016
22. ^ See also [Evaluation Philosophy](#) and [The Art of Evaluation](#) by [Tord Romstad](#), [CCC](#), August 2, 2007
23. ^ [Stockfish Evaluation Guide](#)
24. ^ [exoticorn/stockfish-js · GitHub](#)
25. ^ Part 1 covers [Houdini](#), [Rybka](#), [Komodo](#), [Stockfish](#), [Critic](#), [Naum](#), [Chiron](#) and [Spike](#)
26. ^ [Who is the Master?](#) from [Jean-Marc Alliot's professional website](#)

27. [^ exoticcorn/stockfish-js · GitHub](#)  
28. [^ Delphil 3.3b2 \(2334\) - Stockfish 030916 \(3228\), TCEC Season 9 - Rapid, Round 11](#), September 16, 2016  
29. [^ Regan's latest: Depth of Satisficing](#) by Carl Lumma, [CCC](#), October 09, 2015

## What links here?

Page	Date Edited
<a href="#">Adam Hair</a>	Jan 14, 2017
<a href="#">Albert Silver</a>	Feb 25, 2018
<a href="#">Aleks Peshkov</a>	Jan 13, 2016
<a href="#">Alexander Schmidt</a>	May 17, 2016
<a href="#">Alexander Szabo</a>	Nov 10, 2012
<a href="#">Alfil</a>	Sep 3, 2015
<a href="#">AlphaZero</a>	Feb 10, 2018
<a href="#">Andreas Strangmüller</a>	May 15, 2017
<a href="#">Android</a>	Jan 9, 2018
<a href="#">Andscacs</a>	Jan 16, 2018
<a href="#">Arduino</a>	Feb 21, 2018
<a href="#">Arno Nickel</a>	Sep 25, 2015
<a href="#">asmFish</a>	Feb 14, 2018
<a href="#">Aspiration Windows</a>	Nov 1, 2017
<a href="#">Assembly</a>	Sep 3, 2017
<a href="#">Automated Tuning</a>	Feb 27, 2018
<a href="#">Balint Pfliegel</a>	Aug 30, 2015
<a href="#">Behting Study</a>	Feb 1, 2015
<a href="#">BitScan</a>	Sep 10, 2017
<a href="#">BMI2</a>	Mar 6, 2018
<a href="#">Bob Jenkins</a>	Jun 3, 2017
<a href="#">Bookup</a>	Feb 4, 2018
<a href="#">Bouquet</a>	May 17, 2016
<a href="#">Brainfish</a>	Oct 8, 2017
<a href="#">Branching Factor</a>	Jun 28, 2017
<a href="#">CFish</a>	Feb 1, 2018
<a href="#">Chess Wizard (GUI)</a>	Sep 27, 2011
<a href="#">ChessBrainVB</a>	Jun 24, 2017
<a href="#">ChessMachine</a>	Feb 26, 2018
<a href="#">ChessX</a>	Feb 26, 2015
<a href="#">Chiron</a>	Sep 24, 2017
<a href="#">Clemens Keck</a>	Oct 15, 2017
<a href="#">Clones</a>	Jan 16, 2017
<a href="#">CLOP</a>	Nov 24, 2016
<a href="#">Computer Chess Forums</a>	Nov 26, 2017
<a href="#">Connected Passed Pawns</a>	Mar 27, 2015
<a href="#">Contempt Factor</a>	Mar 10, 2018



Page	Date Edited
<a href="#">Copy-Make</a>	May 23, 2017
<a href="#">Crafty</a>	Jan 28, 2018
<a href="#">Crazyhouse</a>	Dec 27, 2017
<a href="#">Critic</a>	Jan 25, 2014
<a href="#">CuckooChess</a>	Jan 17, 2017
<a href="#">Daniel José Queralto</a>	Dec 31, 2017
<a href="#">Daylen Yang</a>	Sep 8, 2017
<a href="#">Dedicated Chess Computers</a>	Feb 20, 2018
<a href="#">Delphil</a>	Sep 17, 2016
<a href="#">Depth</a>	Feb 25, 2018
<a href="#">DGT Board</a>	Feb 21, 2018
<a href="#">DGT Pi</a>	Oct 22, 2017
<a href="#">DON</a>	Oct 8, 2017
<a href="#">Don Dailey</a>	Dec 7, 2016
<a href="#">Donna</a>	Aug 17, 2017
<a href="#">Draw</a>	Apr 14, 2018
<a href="#">Draw Evaluation</a>	Mar 12, 2018
<a href="#">DroidFish</a>	Jan 17, 2017
<a href="#">Ehsan Rashid</a>	May 4, 2015
<a href="#">Endgame Tablebases</a>	Mar 6, 2018
<a href="#">Engine releases</a>	Apr 23, 2018
<a href="#">Engine Testing</a>	Feb 1, 2018
<a href="#">Engines</a>	Mar 10, 2018
<a href="#">Equinox</a>	Dec 12, 2016
<a href="#">Erin Dame</a>	Dec 2, 2017
<a href="#">Ethereal</a>	Mar 20, 2018
<a href="#">Evaluation</a>	Feb 1, 2018
<a href="#">Evaluation Hash Table</a>	Dec 4, 2016
<a href="#">Evaluation of Pieces</a>	Jan 8, 2018
<a href="#">Fauzi Akram Dabat</a>	Jan 23, 2017
<a href="#">FGRL</a>	Oct 1, 2017
<a href="#">Fifty-move Rule</a>	Aug 9, 2017
<a href="#">Frederic Friedel</a>	Jan 6, 2018
<a href="#">Frédéric Prost</a>	Oct 16, 2014
<a href="#">Futility Pruning</a>	Aug 30, 2017
<a href="#">Game Phases</a>	May 22, 2017
<a href="#">Gary Linscott</a>	Jan 16, 2018
<a href="#">Gavon</a>	Apr 30, 2018
<a href="#">Glaurung</a>	Mar 14, 2017
<a href="#">Graph History Interaction</a>	Oct 16, 2017
<a href="#">Hakkapeliitta</a>	Apr 26, 2016
<a href="#">Harun Taner</a>	May 17, 2015
<a href="#">History Heuristic</a>	Jul 19, 2017
<a href="#">Houdini</a>	Apr 14, 2018
<a href="#">Initial Position</a>	Apr 14, 2018

Page	Date Edited
<a href="#">IPON</a>	Jun 2, 2014
<a href="#">Iteration</a>	May 5, 2017
<a href="#">JavaScript</a>	Dec 11, 2017
<a href="#">Jean-Francois Romang</a>	Oct 23, 2017
<a href="#">Jean-Marc Alliot</a>	Jun 28, 2017
<a href="#">Jeremy Bernstein</a>	Nov 15, 2016
<a href="#">Jonathan Baxter</a>	Feb 11, 2018
<a href="#">Joona Kiiski</a>	Aug 31, 2017
<a href="#">Jose Maria Velasco</a>	Feb 27, 2014
<a href="#">Jouni Uski</a>	Sep 28, 2017
<a href="#">Kai Laskos</a>	Jan 21, 2018
<a href="#">Kenneth Wingate Regan</a>	Feb 19, 2018
<a href="#">King Safety</a>	Feb 14, 2018
<a href="#">Knowledge</a>	Jul 22, 2017
<a href="#">Komodo</a>	Mar 6, 2018
<a href="#">Kvetka</a>	Mar 28, 2016
<a href="#">Larry Kaufman</a>	Jan 28, 2018
<a href="#">Laser</a>	Dec 27, 2017
<a href="#">Late Move Reductions</a>	Sep 25, 2017
<a href="#">Lazy SMP</a>	Jan 4, 2018
<a href="#">LCZero</a>	Apr 18, 2018
<a href="#">Logging</a>	Jan 20, 2018
<a href="#">Louis Zulli</a>	Feb 18, 2015
<a href="#">Lozza</a>	Apr 18, 2018
<a href="#">Lyudmil Antonov</a>	Aug 31, 2017
<a href="#">Lyudmil Tsvetkov</a>	Mar 28, 2018
<a href="#">Macintosh</a>	Dec 7, 2016
<a href="#">Magic Bitboards</a>	Apr 13, 2018
<a href="#">Marcel van Kervinck</a>	Dec 6, 2017
<a href="#">Marco Costalba</a>	Feb 28, 2018
<a href="#">Marek Kwiatkowski</a>	Oct 22, 2017
<a href="#">Mark Watkins</a>	Dec 6, 2017
<a href="#">Martin Fierz</a>	Apr 26, 2018
<a href="#">Martin Sedlak</a>	Dec 25, 2017
<a href="#">Match Statistics</a>	Mar 31, 2018
<a href="#">Material</a>	Mar 31, 2018
<a href="#">Max Dobres</a>	Sep 21, 2016
<a href="#">McBrain</a>	Feb 14, 2018
<a href="#">Mehdi Mhalla</a>	Apr 25, 2014
<a href="#">Memory</a>	Dec 8, 2017
<a href="#">Michael Byrne</a>	Jun 23, 2017
<a href="#">Michel Van den Bergh</a>	Mar 10, 2018
<a href="#">Milos Stanisavljevic</a>	May 23, 2016
<a href="#">Monte-Carlo Tree Search</a>	Apr 26, 2018
<a href="#">Move Ordering</a>	Feb 27, 2018

Page	Date Edited
<a href="#">MTD(f)</a>	Jul 17, 2017
<a href="#">Naum</a>	Nov 23, 2017
<a href="#">Nemorino</a>	Dec 21, 2017
<a href="#">Null Move Pruning</a>	Dec 2, 2017
<a href="#">NUMA</a>	Mar 29, 2017
<a href="#">Oleg Arenz</a>	Feb 1, 2016
<a href="#">One Reply Extensions</a>	Dec 31, 2014
<a href="#">Onno Garms</a>	Jul 19, 2013
<a href="#">Open Source Engines</a>	Jul 14, 2015
<a href="#">Optimization</a>	Feb 28, 2018
<a href="#">Parallel Search</a>	Dec 30, 2017
<a href="#">Pascal Georges</a>	Jun 1, 2014
<a href="#">Pawn Advantage, Win Percentage, and Elo</a>	Dec 20, 2017
<a href="#">Pawn chain</a>	Jan 17, 2018
<a href="#">Persistent Hash Table</a>	Dec 31, 2017
<a href="#">Peter Österlund</a>	Aug 24, 2017
<a href="#">PicoChess</a>	Mar 12, 2018
<a href="#">Piece-Square Tables</a>	Mar 31, 2018
<a href="#">Playing Strength</a>	Mar 31, 2018
<a href="#">Plisk</a>	Dec 31, 2014
<a href="#">Point Value</a>	Mar 31, 2018
<a href="#">Point Value by Regression Analysis</a>	Aug 26, 2017
<a href="#">Population Count</a>	Sep 3, 2017
<a href="#">Portfish</a>	Sep 8, 2016
<a href="#">Principal variation</a>	Dec 4, 2017
<a href="#">ProbCut</a>	Mar 25, 2016
<a href="#">Profiling</a>	Sep 15, 2016
<a href="#">Promotions</a>	Jun 6, 2017
<a href="#">Protector</a>	Oct 12, 2017
<a href="#">Pseudorandom number generator</a>	May 11, 2017
<a href="#">PuppetMaster</a>	Sep 17, 2015
<a href="#">Rahul A. R.</a>	Jan 22, 2017
<a href="#">Ralph Stoesser</a>	Aug 8, 2015
<a href="#">Raspberry Pi</a>	Jun 7, 2017
<a href="#">Raspberry Turk</a>	Sep 7, 2017
<a href="#">Rebel</a>	Feb 25, 2018
<a href="#">RedQueen</a>	Nov 13, 2017
<a href="#">Rein Halbersma</a>	Dec 22, 2015
<a href="#">Relative History Heuristic</a>	Jun 8, 2015
<a href="#">Repetitions</a>	Jan 16, 2018
<a href="#">Revelation II</a>	Jan 8, 2018
<a href="#">Reverse Futility Pruning</a>	Jun 2, 2017
<a href="#">Robert Houdart</a>	Dec 8, 2017
<a href="#">Roman Korba</a>	Nov 28, 2014
<a href="#">Ronald de Man</a>	Nov 20, 2017

Page	Date Edited
<a href="#">Rook Endgame</a>	Sep 18, 2017
<a href="#">Root</a>	Sep 26, 2016
<a href="#">Ruffian</a>	Jun 6, 2017
<a href="#">Rybka</a>	Mar 27, 2017
<a href="#">Salvo Spitaleri</a>	Mar 11, 2013
<a href="#">Scid on the Go</a>	Jan 26, 2015
<a href="#">Score</a>	Apr 14, 2018
<a href="#">Scorpio Bitbases</a>	Mar 12, 2018
<a href="#">Search Statistics</a>	Jan 16, 2018
<a href="#">Selectivity</a>	Jan 12, 2018
<a href="#">Sensory Board</a>	Mar 1, 2018
<a href="#">Shu Yokoyama</a>	Oct 25, 2017
<a href="#">SIMD and SWAR Techniques</a>	Jun 27, 2017
<a href="#">Singular Extensions</a>	Jan 9, 2018
<a href="#">Smaug</a>	Sep 8, 2016
<a href="#">SMP</a>	Dec 26, 2017
<a href="#">Space</a>	Jan 18, 2018
<a href="#">Spike</a>	Jan 7, 2016
<a href="#">SPSA</a>	May 8, 2017
<a href="#">Stefan Pohl</a>	Jan 14, 2018
<a href="#">Sting</a>	Mar 16, 2018
<a href="#">Stockfish</a>	Apr 7, 2018
<a href="#">Stockfish's tuning method</a>	May 21, 2017
<a href="#">Stockfish-js</a>	Sep 23, 2017
<a href="#">Strelka</a>	May 17, 2016
<a href="#">SugaR</a>	Oct 9, 2017
<a href="#">Sunfish</a>	Jan 11, 2018
<a href="#">Syed Fahad</a>	Jan 1, 2017
<a href="#">Syzygy Bases</a>	Apr 19, 2018
<a href="#">Tamal T. Biswas</a>	Jun 19, 2017
<a href="#">Tapered Eval</a>	Jan 9, 2018
<a href="#">Tarrasch</a>	Apr 15, 2017
<a href="#">TCEC</a>	Apr 18, 2018
<a href="#">TCEC Season 10</a>	Jan 3, 2018
<a href="#">TCEC Season 11</a>	Apr 18, 2018
<a href="#">TCEC Season 5</a>	Jun 2, 2014
<a href="#">TCEC Season 6</a>	Dec 2, 2014
<a href="#">TCEC Season 7</a>	Jan 23, 2015
<a href="#">TCEC Season 8</a>	Nov 30, 2015
<a href="#">TCEC Season 9</a>	Nov 6, 2017
<a href="#">Tetsuro Tanaka</a>	Oct 25, 2017
<a href="#">Texel's Tuning Method</a>	Dec 2, 2017
<a href="#">The Spacious Mind</a>	Jan 18, 2017
<a href="#">Thomas Dybdahl Ahle</a>	Aug 26, 2017
<a href="#">Thread</a>	Apr 22, 2018

Page	Date Edited
<a href="#">Time Management</a>	Mar 20, 2018
<a href="#">Tom King</a>	Aug 19, 2017
<a href="#">Tomoyuki Kaneko</a>	Oct 25, 2017
<a href="#">Tord Romstad</a>	Dec 9, 2017
<a href="#">Tournaments</a>	Dec 21, 2017
<a href="#">Transposition Table</a>	Apr 19, 2018
<a href="#">UCI</a>	Mar 4, 2018
<a href="#">UCT</a>	Jan 22, 2018
<a href="#">University of California, Berkeley</a>	Sep 5, 2016
<a href="#">Uri Blass</a>	Feb 26, 2018
<a href="#">USB Chess Board</a>	Apr 21, 2015
<a href="#">Volker Böhm</a>	Jan 7, 2016
<a href="#">WChess</a>	Jan 7, 2016
<a href="#">WCRCC 2009</a>	Jul 14, 2014
<a href="#">Who's Who</a>	Sep 6, 2017
<a href="#">Wrong color Bishop and rook pawn</a>	Oct 19, 2017
<a href="#">WyldChess</a>	Mar 10, 2018
<a href="#">Xiphos</a>	Apr 22, 2018
<a href="#">Yakup Ipek</a>	Sep 6, 2015
<a href="#">Zappa</a>	Oct 24, 2017

[Up one Level](#)