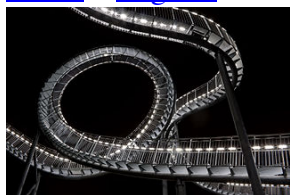


[Home](#) * [Engines](#) * **Loop**



[Tiger and Turtle](#) - illuminated
looping ^[2]

Loop,

a chess program by [Fritz Reul](#) with different [board representations](#) for 32-bit and 64-bit platforms as subject of Reul's Ph.D. thesis *New Architectures in Computer Chess* ^[1]. Despite different board representation, both Loop versions presumably share same [search](#) and [evaluation](#) with similar features and weights.

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32-bit Loop

The 32-bit program, based on Reul's former program [List](#), relies on a [15x12 board](#) representation in conjunction with disjoint [piece-lists](#) with adequate [move generation](#) of [blocker loops](#). It participated as *Loop Leiden* at the [DOCCC 2006](#), becoming strong runner up behind [Rybka](#). A specially adapted version called *Loop Express* became the engine of [Wii Chess](#) for the [Nintendo Wii console](#) in 2008 ^[3]. The non-bitboard data-structure of Loop was also applied in [Chrilly Donninger's](#) chess machine [Hydra](#) ^[4].

Reul in his thesis ^[5]:

This computerchess architecture was first implemented in the quite successful computerchess engine Loop Leiden 2006. The computerchess architecture was later implemented partially in Hydra and completely in Wii Chess by Nintendo (see Section 2.1). The high performance was just as important for these projects as the simplicity and ease of implementation in the following two environments: (1) the environment of a sophisticated computer-chess machine (Hydra) and (2) the environment of a commercial games console with the highest quality and security standards.

64-bit Loop

The [bitboard](#) based Loop applies [Magic Bitboards](#) for [sliding piece attack generation](#). Further, iterative [alpha-beta](#) bounded [static exchange evaluation](#) was applied to *Loop Amsterdam* ^[6], also performing a [parallel search](#) for a quad-core processor, which played a strong [WCCC 2007](#) in [Amsterdam](#), and became Third, behind the later disqualified [Rybka](#), and [Zappa](#) ^[7].

Fritz Reul on an essential reason of Loop's success in Amsterdam in his thesis ^[8]:

A complete computer-chess architecture based on hash functions and magic multiplications for the examination of bitboards is implemented in the computerchess engine Loop Amsterdam. This engine was able to reach the 3rd place at the 15th World Computer-Chess Championship, Amsterdam (NL) 2007. An essential reason for the success of this 64-bit computer-chess engine was the use of highly sophisticated perfect hash functions and magic multipliers for the computation of compound bit-patterns (bitboards) via perfect hashing.

Evaluation

Preliminary Considerations

Evaluation was only marginally covered in Reul's thesis. In *Preliminary Considerations* he mentioned discussions with [Chrilly Donniger](#), [Fabien Letouzey](#) and [Tord Romstad](#), and the exchange of source codes [\[9\]](#):

This thesis also does not aim at the explicit consideration of known computer-chess architectures, such as [Rotated Bitboards](#) [\[10\]](#) [\[11\]](#) or the [0x88](#) representation [\[12\]](#). Many a reference used in this thesis is not available in a scientifically elaborate form. This includes personal conversations with programmers [\[13\]](#), [\[14\]](#) [\[15\]](#) and the **exchange of source codes** as well as discussions via email. In this way the contents of this thesis can be regarded to be on a state-of the-art level of the research and development in the field of the computer-chess architectures.

Fruit Evaluation Overlap

During the [ICGA Investigations](#) concerning the [Rybka Controversy](#) and [evaluation overlaps](#), 64-bit Loop was inspected by [Mark Watkins](#) who found congruence with the evaluation of [Fruit 2.1](#) [\[16\]](#). As confirmed by [David Levy](#) [\[17\]](#), the [ICGA](#) has received a complaint on Loop by Fruit author [Fabien Letouzey](#) and an investigation has been started about this case, as already mentioned by Watkins in August 2011 [\[18\]](#).

Complaints

[ICGA](#) President [David Levy](#), May 09, 2014 [\[19\]](#)

The ICGA has received formal complaints against the Chess programs LOOP and [THINKER](#), both of which have participated in the World Computer Chess Championship. LOOP was entered by Fritz Reul into the [2007 WCCC](#) in Amsterdam. THINKER was entered into the [2010 WCCC](#) in Kanazawa.

...

Here we present extracts from the first section of each of [Mark Watkins](#) reports.

Loop "The version examined here is Loop 2007 (64-bit), which was released at approximately the same time as the WCCC. There is notable

similarity to Fruit in the evaluation function (other components were not examined)."

...

Based on the above mentioned reports by Mark Watkins the ICGA is convinced that, at the very least, both Fritz Reul and [Kerwin Medina](#) have a case to answer. Depending on how Reul and/or Medina respond to these allegations the ICGA might decide to conduct further investigations and/or take some form of strong sanctioning action against the programmers. However, the ICGA does not intend to proceed further along the route to strong sanctions for the time being, in order to give these programmers more time in which to make contact with the ICGA President and present their defence to the allegations. If either or both of these programmers fail to do so by December 31st 2014, or refuses to do so, the ICGA will disqualify them from all their results in ICGA events. In the meantime the ICGA has decided to suspend both Fritz Reul and Kerwin Medina from participation in all ICGA events until such time as they have made contact and offered a defence.

See also

- [Coiled](#)
- [Iteration](#)
- [Iterative Search](#)
- [List](#)
- [Wii Chess](#)

Publications

- [Fritz Reul](#) (2009). *New Architectures in Computer Chess*. Ph.D. Thesis
- [Fritz Reul](#) (2010). *Static Exchange Evaluation with $\alpha\beta$ -Approach*. [ICGA Journal, Vol. 33, No. 1](#)

Forum Posts

2005 ...

- [Loop List available soon](#) by [Fritz Reul](#), [CCC](#), October 11, 2005
[Re: Loop List commercially available soon](#) by [Günther Simon](#), [CCC](#), October 11, 2005
- [Loop 13.6 soon available](#) by [Gerhard Sonnabend](#), [CCC](#), April 20, 2007
- [doing undoing](#) by [Fritz Reul](#), [CCC](#), May 14, 2007
- [Iterative DTS](#) by [Fritz Reul](#), [CCC](#), July 02, 2007
- [Re: Bob Hyatt says that...](#) by [Mike Scheidl](#), [CCC](#), August 29, 2008
- [Re: Bob Hyatt says that...](#) by [Uri Blass](#), [CCC](#), August 30, 2008

2010 ...

- [Loop 2007 / Fruit 2.1](#) by [BB+](#), [OpenChess Forum](#), April 18, 2011 » [Fruit](#)
- [Loop as a Fruit clone](#) by [Rebel](#), [Rybka Forum](#), September 20, 2013
- [Complaints against the Chess programs LOOP and THINKER](#) by [Harvey Williamson](#), [Hiarcs Forum](#), May 12, 2014
- [Complaints against the Chess programs LOOP and THINKER](#) by [Harvey Williamson](#), [CCC](#), May 14, 2014

2015 ...

- [Re: FIDE Rules on ICGA - Rybka controversy](#) by [BB+](#), [OpenChess Forum](#), May 08, 2015

External Links

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- [List's ICGA Tournaments](#) (covers Loop)
- [Wii Chess from Wikipedia](#)
- [ICGA/Rybka controversy: Feedback - Allegations against another Chess Engine – The LOOP Program](#) by [David Levy](#), [ChessBase News](#), February 17, 2012
- [Allegations against two more Chess Engines – The LOOP Program](#) by [David Levy](#), [ICGA](#) president, May 22, 2012 » [Thinker](#)
- [Complaints against the Chess programs LOOP and THINKER](#) by [David Levy](#), [ICGA](#) President, May 9, 2014

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- [Loop disambiguation page from Wikipedia](#)
- [The Loop disambiguation page from Wikipedia](#)
- [Looping disambiguation page from Wikipedia](#)
- [Loop control flow from Wikipedia](#)
 - [For loop](#)
 - [Foreach loop](#)
 - [While loop](#)
 - [Do while loop](#)
 - [Infinite loop](#)

References

1. [^] [Fritz Reul](#) (2009). *New Architectures in Computer Chess*. Ph.D. Thesis
2. [^] [Tiger and Turtle – Magic Mountain](#) is a monument in the [Angerpark](#) in [Duisburg](#), Germany. Here you see its illuminated looping at night, [Image](#) by Kleunam, November 18, 2011, [CC BY-SA 3.0](#), [Category:Tiger and Turtle – Magic Mountain](#), [Wikimedia Commons](#), [The Industrial Heritage Trail](#)

3. [^ Fritz Reul](#) (2009). *New Architectures in Computer Chess*, Ph.D. Thesis, 2.2.2 Nintendo Wii Chess, pp. 11
4. [^ Fritz Reul](#) (2009). *New Architectures in Computer Chess*, Ph.D. Thesis, 2.2.1 The Chess Machine Hydra, pp. 11
5. [^ Fritz Reul](#) (2009). *New Architectures in Computer Chess*, Ph.D. Thesis, 5.1.1 Non-Bitboard Architectures, pp. 96
6. [^ Fritz Reul](#) (2010). *Static Exchange Evaluation with $\alpha\beta$ -Approach*. [ICGA Journal, Vol. 33, No. 1](#)
7. [^ 15th World Computer Chess Championship - Amsterdam 2007 \(ICGA Tournaments\)](#)
8. [^ Fritz Reul](#) (2009). *New Architectures in Computer Chess*, Ph.D. Thesis, 5.1.2 Magic Hash Functions for Bitboards, pp. 97
9. [^ Fritz Reul](#) (2009). *New Architectures in Computer Chess*, Ph.D. Thesis, 1.2 Preliminary Considerations, pp. 3-4
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13. [^ Chrilly Donninger](#) (2006). *Discussion with Dr. Christian Donninger*.
14. [^ Fabien Letouzey](#) (2006). *Personal discussion with Fabien Letouzey*.
15. [^ Tord Romstad](#) (2007). *Discussion with Tord Romstad*.
16. [^ Loop 2007 / Fruit 2.1](#) by [BB+](#), [OpenChess Forum](#), April 18, 2011
17. [^ ICGA/Rybka controversy: Feedback - Allegations against another Chess Engine – The LOOP Program](#) by [David Levy](#), [ChessBase News](#), February 17, 2012
18. [^ Re: Loop 2007 / Fruit 2.1](#) by [BB+](#), [OpenChess Forum](#), August 22, 2011
19. [^ Complaints against the Chess programs LOOP and THINKER](#) by [David Levy](#), [ICGA](#) President, May 9, 2014

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