

Copy-Make (/Copy-Make)

✖ It's time for us to say farewell... Regretfully, we've made the tough decision to close Wikispaces. Find out why, and what will happen, here (<http://blog.wikispaces.com/>) 0 (/Copy-Make#discussion) 27 (/page/history/Copy-Make) ... (/page/menu/Copy-Make)

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While traversing a [Search Tree](#), the **Copy-Make** approach keeps and updates local copies of certain aspects of a [chess position](#) inside an array indexed by [ply](#), which could also be interpreted as explicit, random accessible search [stack](#). It usually refers the irreversible aspects of the position, like [ep state](#), [castling rights](#) and the [halfmove clock](#), which can not [incrementally updated](#) during [unmake move](#). Some programs even keep reversible stuff inside an array, to avoid incremental update during unmake. Copy-Make is required, if aspects need to be accessed randomly in the current branch from the [root](#) (or even starting game position) to the current one.

Copy-Make

```
// make
memcpy (&position[ply+1].irrversAspects,
        &position[ply ].irrversAspects,
        sizeof(irrvrsAspects));

ply++;
update (position[ply], move)
...
// unmake
ply--;
// position[ply] is still valid
```

Stack

The alternative, to maintain those irreversible aspects inside a global structure, would require a [stack \(LIFO\)](#), with push and global update during make, and pop from stack to global structure during unmake, and therefor higher memory bandwidth for copying back and forth.

```
// make
push (position.irreversibleAspects);
ply++;
update (position, move)
...
// unmake
ply--;
pop (position.irreversibleAspects);
// position is restored from stack
```

See also

- [Encoding Moves](#)
- [Incremental Updates](#)
- [Make Move](#)
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Forum Posts

1995 ...

- [cheaper search ?](#) by [James F. Long](#), [rgcc](#), April 27, 1997 » [Tristram](#)
[Re: cheaper search ?](#) by [Shaun Press](#), [rgcc](#), April 28, 1997 » [Vanilla Chess](#), [KnightCap](#)
- [Unmake move v copy the board](#) by Hugh Cumper, [CCC](#), January 24, 1999

2000 ...

- [The need to unmake move](#) by [Mathieu Pagé](#), [CCC](#), August 19, 2003 » [Unmake Move](#)
- [undo move vs. Position Cloning](#) by [BoidReceiver](#), [CCC](#), September 16, 2009
- [Re: undo move vs. Position Cloning](#) by [Marek Costalba](#), [CCC](#), September 16, 2009 » [Stefanfink](#)
- [Re: undo move vs. Position Cloning](#) by [Dan Dailey](#), [CCC](#), September 16, 2009 » [Doch](#)
- [copy/make vs make/unmake test results](#) by [Robert Hyatt](#), [CCC](#), September 19, 2009 » [Crafty](#)

2010 ...

- [Copy Board vs Unmake Move](#) by [ChrisJ](#), [OpenChess Forum](#), September 29, 2010
- [performance of copy-make](#) by [Rein Halbersma](#), [CCC](#), August 02, 2011
- [How costly is taking moves back ?](#) by [Piotr Lopusiewicz](#), [CCC](#), April 30, 2013
- [Saving info before making a move](#) by [CDailey11](#), [OpenChess Forum](#), December 30, 2013
- [copy/make vs make/unmake](#) by [Robert Hyatt](#), [CCC](#), January 07, 2014
- [Memory usage in make/unmake vs logic complexity](#) by [Matthew Lai](#), [CCC](#), August 30, 2014

2015 ...

- [Unifying make/undo and copy-make](#) by [Rein Halbersma](#), [CCC](#), December 21, 2015
- [Copy-make vs Make/Unmake ?](#) by [Mahmoud Uthman](#), [CCC](#), November 12, 2016

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