

How does one elaborate design using CRC cards?

Asked 16 years, 3 months ago Modified 2 years, 4 months ago

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32



I've always been wondering how people use CRC (class responsibility collaboration) cards. I've read about them in books, found vague information on the internet, but never grasped it really. I think someone ought to make a youtube video showing a session with CRC cards, since one of my books described it as being very hard to formulate in text, that it should be "taught by someone who already masters it". Sadly, I know noone around here who uses CRC cards and I'd like to learn more.

UPDATE

Any links to videos showing people elaborating with this technique would be appreciated.

oop

ood

crc-cards

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edited Feb 19, 2010 at 11:58

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asked Sep 19, 2008 at 2:07



[Statement](#)

4,038 ● 3 ● 40 ● 45

3 "Any links to videos showing people doing it would be appreciated." *giggle* – [Epaga](#) Mar 4, 2009 at 8:08

It's nice to see that someone on SO has a sense of humor.
– [Steven A. Lowe](#) Mar 5, 2009 at 2:08

6 Answers

Sorted by:

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36



It's hard to summarize in an SO answer, but I'll try. One of the challenges of designing objects is balancing thinking from an overall perspective with thinking from the perspective of an individual object. You need the overall perspective to get the computation completed, but you need the individual object perspective to effectively subdivide the logic and data.

Maintaining this balance is where CRC cards come in. When they are sitting there on the table, you get to look at the computation as a whole. When you pick up a single card, though, you are physically, kinesthetically encouraged to take the point of view of that one object--I have this little piece of this computation to do with limited resources, how am I going to accomplish it?

Over time, the ability to simultaneously hold both perspectives seems to soak into the brain. Less and less gets written on the cards. Then the cards are blank. After

a while people just point to where the card would be if they would bother taking a blank one off the stack. Eventually, people have the benefits of the thinking style without needing cards at all. When talking with someone who hasn't mastered the balance, pulling out reals cards can be a useful communication assist, though.

The biggest weakness I find with the cards is the lack of feedback. You can fool yourself about how the code is going to turn out. I would suggest using cards only until an interesting question comes up, turn to tests/code for confirmation, and then resume designing.

Ward and I made a video 15 or so years ago of a design session, but I don't find it online anywhere and I don't have a copy. I'm not sure it would be useful as a teaching tool in any case. I don't know of other videos, but they could be interesting, especially if you got to compare several different designer's styles.

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answered Feb 27, 2009 at 18:11

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Kent Beck

5,011 ● 2 ● 31 ● 31

Very good answer. This is a candidate for AA but I'll draw on it a little longer to see if anyone else also has some good points to draw on to the discussion. Videos would be great but I have failed to find any. Videos would be highly sought for as I think this is one of those "u gotta see it urself"

– [Statement](#) Feb 28, 2009 at 0:26

3 @[Statement]: uh...you're not likely to get a better answer - this is one of the guys that invented it! – [Steven A. Lowe](#) Mar

@[Steven A. Lowe] Kent Beck may well be one of the inventors, but that doesn't mean that other people can't draw more light on the subject. Particularly from people who have used and evaluated the technique. Just because the author has answered wouldn't mean that no one else should give their opinion – [Statement](#) Mar 4, 2009 at 8:54

- 2 @[Statement]: I didn't say no one else should answer. But note of the top 2 answers, one is a link to a Kent Beck paper, and the other is a response from Kent Beck. There just might be a pattern emerging... ;-) – [Steven A. Lowe](#) Mar 4, 2009 at 14:57
-



14



+500



I'll try to give an answer. So CRC cards are generally used for modelling in a Object-Oriented environment to get a better understanding of the system that has to be developed (but that I think you'll know already). CRC cards come at the very end, when you arrive just before the actual implementation. The different steps to reach that level could be the following:

1. The starting point is to do the requirement elicitation. Involving the customer early and continuously is suggested here (take a look at Agile approaches, i.e. Extreme Programming)
2. The requirements can then be modeled either with Use Case diagrams (UML) or with User stories (agile extreme programming approach). The key problem here is to find the right involved objects. This depends very much on the domain you're in, of

course. If you go the "hard" way, you can apply techniques like "noun extraction". So you parse the specification document and extract all nouns (including composite names and those with adjectives). Analyze all of them and discard the irrelevant ones.

3. Once you have the right nouns -> objects you can start creating your CRC cards. So what is done in a CRC session? The main task is to find and assign the responsibilities of your (previously) found objects which are then put down on small index cards (our CRC cards). "Responsibilities" are mainly the core functionalities of a specific object and the "collaboration" part are the needed other objects for fulfilling certain functionalities (these are the dependencies among the different objects in your model). Important points for assigning the responsibilities is that the responsibilities are distributed well on the whole system in some kind of balanced way. Another very important point is to avoid any duplication of responsibilities among the objects (this is where the CRC cards help). A CRC session should start with a brainstorming meeting, having an active discussion among the developers and it should be performed on the actual index cards directly.

I hope I was able to somehow help you.

Regards,
Juri

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edited Feb 27, 2009 at 17:53

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DJ.

16.2k ● 3 ● 44 ● 46

answered Feb 27, 2009 at 17:34



Juri

32.9k ● 20 ● 106 ● 137

Yes, you were able to help me understand a great deal more. So CRC cards are used to find method candidates, as well as parameter arguments, for any given classes in a loosely defined system? – [Statement](#) Feb 28, 2009 at 0:32

-
- 1 I wouldn't say methods and parameters, but more on the point of responsibilities (which then lead to the methods). CRC cards should be a means for getting a better overview of your system and for facilitating discussions among developers. Otherwise you shouldn't use them. They shouldn't hinder you. – [Juri](#) Feb 28, 2009 at 14:22

A (funny) thing I noticed when reading your comment again, @Juri, is that inherently all *new* things seem to hinder you in one way or another. You have to get past the initial barrier of confusion or uncertainty until you get to feel deep down if it is a hindrance or not. Until you know how it fully works or until you see the value clearly, I think most (if not all) new ideas seem like a hinder. :) – [Statement](#) Feb 24, 2011 at 11:58

fair enough, but it depends on whether it *seems* like a hinder just because you're facing the initial learning curve or it *really* hinders you because it just doesn't fit the way you and your team are working. I remember when Erich Gamma (Eclipse) held a presentation as a guest lecturer at our university; he's one of the fathers of XP, practices like customer on site, pair programming etc. On a question on whether they actively practice pair programming on their team he said they tried,

but it didn't work for them, so they left it. You know what I mean :) – [Juri](#) Feb 24, 2011 at 19:03



7



I think your statement "*I know noone around here who uses CRC cards*" pretty much sums up the state of CRC cards in development. CRC cards, in my opinion, were a step on the road from traditional, plan-driven development to agile development. The world has moved on. Instead of focusing on how to use CRC cards, I'd investigate techniques like [TDD](#), which can make use of techniques like UML and CRC cards as intermediate artifacts but which concentrates on code, and more particularly on tests. This is the direction that the inventors of CRC cards have taken and I'd recommend that you take also.

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answered Feb 28, 2009 at 17:33

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[tvanfossion](#)

532k ● 102 ● 699 ● 798

Well it seems that if this is true, then my books are quite outdated :x. I will surely check out TDD though. Thanks for your input. – [Statement](#) Feb 28, 2009 at 18:17

I've been to three out of the last 4 Agile Development conferences and I can assure you that CRC cards are NOT the hot topic there. I'm not saying they're useless, but I wouldn't be building a development methodology around them either. – [tvanfossion](#) Feb 28, 2009 at 18:47

You might want to check out last year's program for Agile 2008 for a overview of state-of-the-art in agile: agile2008.org
– [tvanfosson](#) Feb 28, 2009 at 18:49



go to [the source](#) - Kent Beck, Ward Cunningham, ever heard of them?

6



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answered Sep 19, 2008 at 3:15

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[Steven A. Lowe](#)

61.1k ● 19 ● 135 ● 204



6 it seems the 'source' came to us :) – [rohancragg](#) Oct 13, 2009 at 16:15

It would be helpful to include some of the information from that link in your answer. – [tim-phillips](#) May 30 at 16:17

@tim-phillips not really; it's a short article full of illustrations, not easily summarized – [Steven A. Lowe](#) Jun 1 at 17:28



Easiest way to use them in my opinion without getting into a mess is to write down little CRC cards in your file headers like this:

5



```
////////////////////  
/** CRC CARD  
/** Class: UISliderEvent  
/** Responsibility: Event that holds the value  
and id of a Slider's movement
```




```
/** Collaborators: UISlider, UIEvent  
////////////////////////////////////
```

Then everytime you need to add a feature check your card and be sure you don't break any of the contracts you stated in it. Such as all of the sudden depending on `UIMouseEvent` for example, that's nowhere on the Card so its a no-no to include it.

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answered Sep 19, 2008 at 3:45

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Robert Gould

69.7k ● 61 ● 191 ● 275

Are you using this as a common practice? – [Statement](#) Sep 19, 2008 at 4:12



4



In their book [Object Design: roles, responsibilities, and collaborations](#) published in 2003 [Rebecca Wirfs-Brock](#) & Alan McKean discuss CRC cards in some detail. They really emphasise the difference it makes to the whole procedure that this should be a very tactile experience and it loosens people's thinking to be passing round a physical object when trying to flesh out a design / requirement.

The sub-title of that chapter suggests that using the cards is a part of the 'exploratory design' phase so it probably comes prior to doing much coding, but I see no reason you wouldn't keep coming back to them in each iteration of an Agile project and reminding yourself where you

thought you were going and reviewing that if need-be (as a group of course).

I seem to remember that they even suggest passing a ball around the room so that only the person that has the ball is allowed to speak, so perhaps it's not so much the CRC cards as the getting everyone in a room talking about roles and responsibilities of objects that matters?

If you'd like to read a case-study of CRC cards in action (in addition to Kent and Ward's original paper of course) then have a look at [The CRC card book](#).

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edited Oct 13, 2009 at 16:45

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answered Oct 13, 2009 at 16:24



[rohancragg](#)

5,106 ● 5 ● 38 ● 47

Yes, I realise that I'm re-stating some of what Kent Beck said but I wanted to bring these books to people's attention rather than trying to give a canonical answer per-se. Hopefully this shows that since the original paper there are some people who've taken the idea and have run with it. – [rohancragg](#) Oct 13, 2009 at 16:54

This sounds great, I must check out that literature to see if I can finally understand CRC cards. Although I must admit that I have since the original post learned a great deal more about software design, and I suppose I understand -what- they are achieving. Basically I was looking for tools to flesh out the responsibilities for my classes, but since I started learning TDD it came apparent to me that TDD automatically drives

me to do elaboration designs without having to think explicitly about it. – [Statement](#) Feb 19, 2010 at 11:52

CRC cards seems like a nice supplementary tool when working with people who don't know advanced design solutions, but any other analogue that gets the message across should be equally suited for communicating the need of abstraction and elaboration. – [Statement](#) Feb 19, 2010 at 11:54
