What is Blockchain – a primer for market researchers

David Gerard

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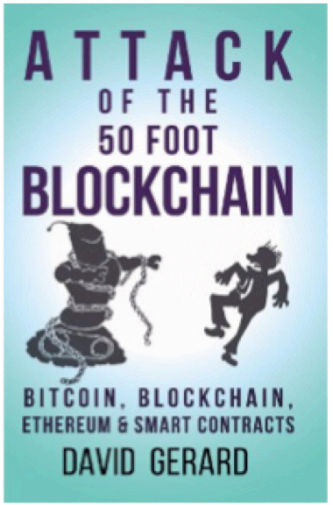
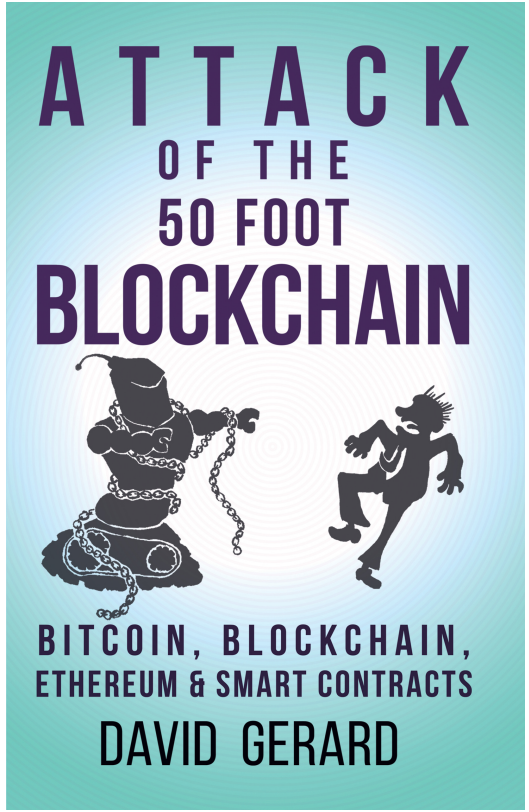


What can the Blockchain do for me?

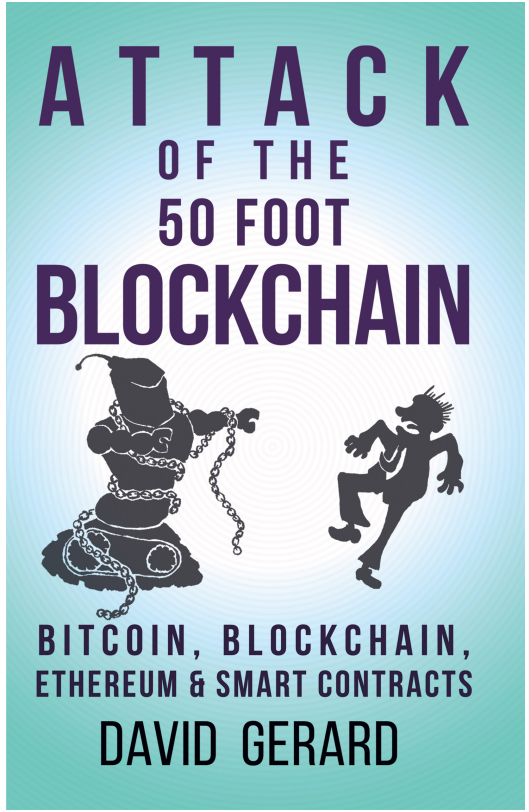
The basics of Blockchain —
what, why, cautions to take

David Gerard



David Gerard

- Music journalist, moved to IT
- Started following Bitcoin in 2011
- Started *Attack of the 50 Foot Blockchain* in late 2016
  - *well-timed for the bubble!*



The basics of Blockchain

- What actually is all this stuff?

1. The blockchain data structure — *append-only ledgers*
2. Bitcoin — *the origin of “blockchain” hype*
3. Blockchain in business — *“but what are the use cases?”*

1. What on earth is a “blockchain”?

Simple accounting ledger

- Just a list of transactions
-

From	To	Date	Amount
Satoshi	Hal	09 January 2009	$50.00
Vitalik	Gavin	09 January 2009	$1,000.00
Craig	Ian	10 January 2009	$0.02
Vitalik	Eliezer	12 January 2009	$300,000.00
Mark	Aleksandr	13 January 2009	$400,000,000.00

- But – how can we ensure against errors?

Check digits

- Last digit of a credit card:
  - 4012 8888 8888 1881
- Calculated from the other digits – a *checksum*
- If it’s wrong, it’s not a valid card number!

Hashes – extended check digits

- Much longer checksum, from any data
- *e.g.,* 8743b52063cd84097a65d1633f5c74f5
- If the hash is the same, the data is the same!
- Very fast to calculate – *data→hash*
- Utterly unfeasible to reverse! – *hash → data*
  – *very hard to fake!*
- *We'll mention hashes again later ...*

Simple ledger with hashes

- Let’s attach a hash to every record!

From	To	Date	Amount	Hash
Satoshi	Hal	09 January 2009	$50.00	8227fb49
Vitalik	Gavin	09 January 2009	$1,000.00	d64ad954
Craig	Ian	10 January 2009	$0.02	85e19b86
Vitalik	Eliezer	12 January 2009	$300,000.00	9749ce74
Mark	Aleksandr	13 January 2009	$400,000,000.00	5c397c18

Let’s hash all the hashes!

From	To	Date	Amount	Hash
Satoshi	Hal	09 January 2009	$50.00	8227fb49
Vitalik	Gavin	09 January 2009	$1,000.00	d64ad954
Craig	Ian	10 January 2009	$0.02	85e19b86
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				d8eb1c14

- So if we know that last hash – we know that the whole block has to come to that hash!
- Saves rehashing whole block for each new entry

Let’s chain the blocks!

- Each block’s hash is also hashed with the next block
- This gives us a hash of the whole chain

From	To	Date	Amount	Hash
Satoshi	Hal	09 January 2009	$50.00	8227fb49
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Craig	Ian	10 January 2009	$0.02	85e19b86
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Tamper-evident append-only ledger!

- Distribute the ledger
- You can quickly verify the hashes of your copy
- But — it’d be impossibly slow to fake!
- This hash-of-hashes construct is called a Merkle Tree (1979) — used in Bitcoin (2009)
- So … where did all the magical promises for “Blockchain” come from?

2. Bitcoin

2. Why Bitcoin

- Digital cash would be a useful thing
- We could use this hard-to-fake ledger for our new digital cash!
- But – who gets to add new entries?
- Obvious answer: central authority (bank)
- But ...

Bitcoin’s founders had odd requirements

- Not a payment system, but a political project
- Founded in ideology — *extremist libertarianism*
- No central authority at all — *no trust requirement*
- A completely rigid gold standard! — *digital version*
- Credit is bad too —*use the actual “gold” as money*

The fabulous promises of Bitcoin!

- Decentralised! Trustless!
- Fast and free!
- Uncensorable and irreversible!
- No “just printing money”!
- Will destroy banks and governments!
  – *they really claimed this*

How the promises worked out

- Bitcoin had recentralised by early 2014
- Bitcoin “mining” has economies of scale
  — *so it recentralises*
- Four mining pools issue most of the bitcoins
- One company makes 80% of the mining chips
- Bitcoin uses 0.1-0.5% of *all the electricity in the world*
  — *for 7 transactions per second worldwide*

How the promises worked out

- Uncensorable! Irreversible!
- Turns out not to be what users want
  – *consumers like chargebacks, increases confidence*
- Errors, fraud, thefts not easily reversible
  – *irreversibility is a fraudster's charter*
- Brittle!
  – *one mistake and you've lost your coins*

How the promises worked out

- You can’t “just print” bitcoins
- BUT – anyone can copy the code
  – and they did – 1000+ altcoins
- Market treats all these as one pool, “cryptos”
- Bitcoin is just like gold! … if you could create new gold mines by cut’n’paste
- Other coins (“altcoins”) don’t do much better

3. Blockchain for business

What organisations want

- Any organisation — business, non-profit, government — has bureaucracy — the machinery they run on
- Can we make this work better?
- … with ***blockchains?***

“Blockchain”

- Bitcoin losing lustre by early 2014
- So, market to business as“Blockchain technology”
- *a.k.a.* “Distributed Ledger Technology” (DLT)
  — *do shared Excel sheets count?*
- But – the promises are still Bitcoin promises!
  — *else, shared Excel sheets would count*
- “Blockchain” is a particular collection of marketing promises
  — *not any particular technology*

The fabulous promises of Blockchain!

- Literally the Bitcoin promises
  — *just change the buzzword!*
- Decentralised, fast and free!
  — *“against who” is not clear — no sensible threat model*
- Uncensorable, irreversible, immutable, incorruptible!
  — *nobody say “GDPR”*
- Smart Contracts for added magic!
  — *the hard bit is always done by “smart contracts”*
  — *which literally means “with a computer program”*

The fabulous promises of Blockchain!

- Actual promises from one large vendor:

- “an enterprise-class, cross-industry open standard for distributed ledgers that can transform the way business transactions are conducted globally”

- “highly secure blockchain services and frameworks that address regulatory compliance across financial services, government, and healthcare”

The fabulous promises of Blockchain!

- Last two – “is” statements that are really “could”
  — *“could” is a word meaning “doesn’t”*
- No existing software does all those things
- Blockchain marketing promises things that *literally don’t exist yet*
  — *e.g. patient-controlled healthcare data*
- If it sounds too good to be true … it is.

Blockchains in the real world

- Almost none in production use
- World Food Programme
  — *single-user private Ethereum – i.e., a database*
- Press releases
  — *a majority from IBM*
- Pilot programmes
  — *lots of these from IBM*
  — *all actually centralised systems (Walmart, Maersk)*

6 questions for your salesperson

- The obvious skeptical questions:
- **1.** Are they mixing up “might” and “is”? Does their software do *all* the stuff they said?
- **2.** Will the system scale to the size of your data? How?
- **3.** How do you deal with human error in the “immutable” blockchain or smart contracts?

6 questions for your salesperson

- **4.** If this is to work with people you trust less than the ones you deal with now – what’s your threat model?
- **5.** If it’s to work with people you can already trust – why blockchain?
- **6.** What does this get you that a centralised database can’t?

GDPR and blockchains

- GDPR requires *any* collection of personal data to be *redactable*
- **Never** put personal data into a blockchain!
- Blockchain-for-marketing pitches claim using a blockchain will help *comply* with GDPR
- This is completely false

How to reverse a hash

- Hashes are irreversible …
  … unless you have a table of someone else's hashes

Issues to consider

- Magic doesn’t happen
  — *if it sounds too good to be true, it probably is*
- **Never** put personal data into a blockchain!
  — *even hashed personal data*
  — *don’t let even slightly personal data within a mile of it*
- If it sounds too good to be true …
- … it probably is

Any questions?

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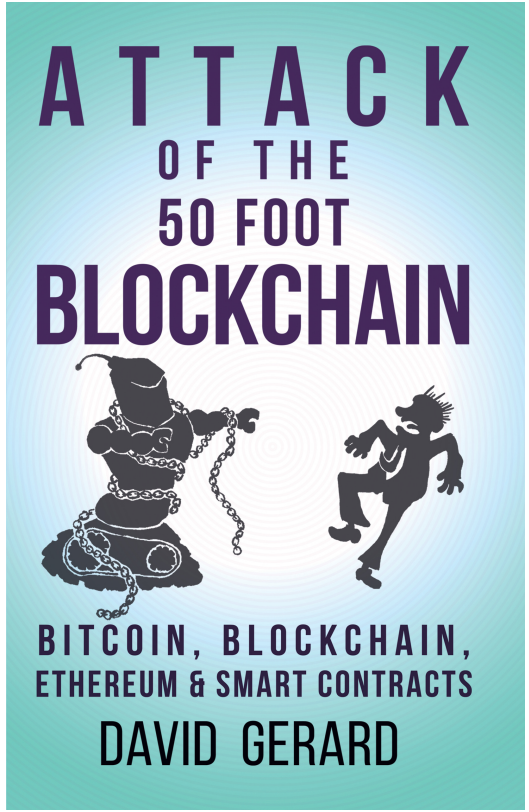

Q & A

David Gerard

Ray Poynter

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