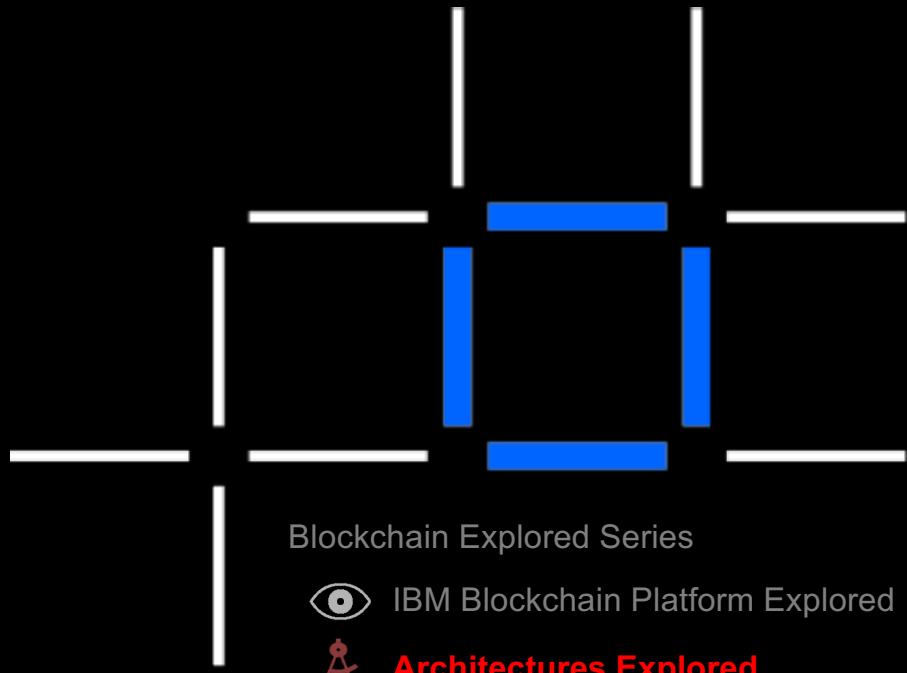
Architectures Explored - GDPR

Best practices for GDPR-compliant blockchains



Blockchain Explored Series

- IBM Blockchain Platform Explored
- **Architectures Explored**
- Fabric Explored
- Composer Explored
- What's New

V1.0, 8 June 2018

IBM **Blockchain**

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Summary of GDPR

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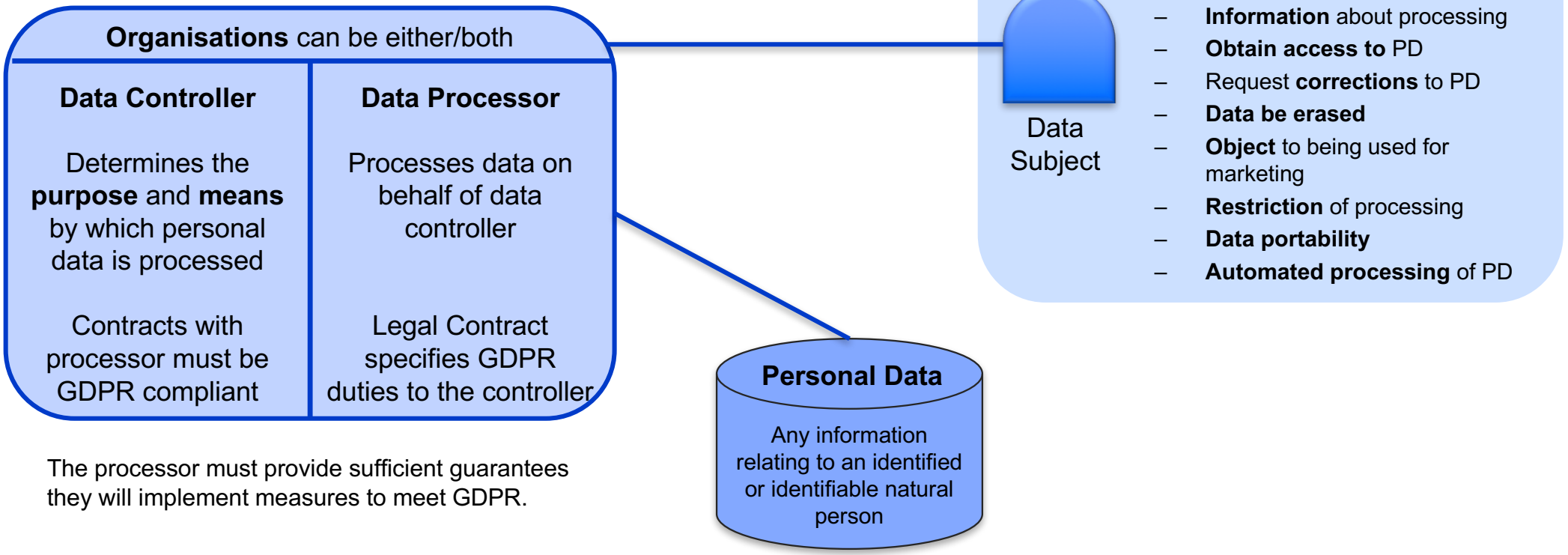
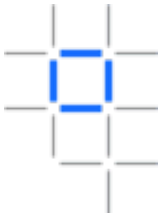
General Data Protection Regulation (GDPR) – Overview

- GDPR became law on 25th May 2018
- Applies to organisations operating within the EU, also applies to organisations outside the EU who offer goods/services to EU individuals
- Fines of €20m or 4% of global revenues



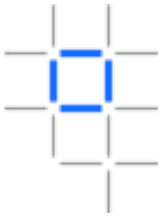
The processor must provide sufficient guarantees they will implement measures to meet GDPR.

General Data Protection Regulation (GDPR) – Links



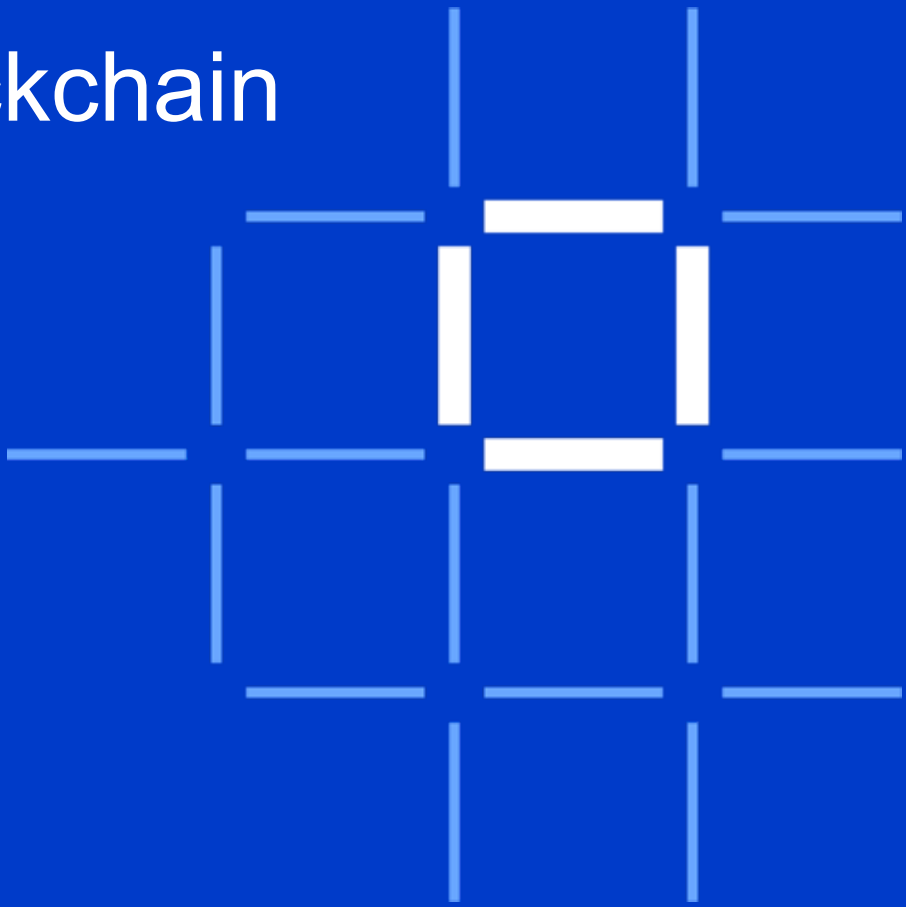
- Rights for citizens
  - https://ec.europa.eu/info/law/law-topic/data-protection/reform/rights-citizens/my-rights/what-are-my-rights_en
- What is Personal Data?
  - https://ec.europa.eu/info/law/law-topic/data-protection/reform/what-personal-data_en
  - Examples: Names, Address, Email, ID Card number, Location Data, IP Address, Cookie ID, Advertising ID
  - https://ico.org.uk/media/for-organisations/documents/1554/determining-what-is-personal-data.pdf
- What is a data controller or processor?
  - https://ec.europa.eu/info/law/law-topic/data-protection/reform/rules-business-and-organisations/obligations/controller-processor/what-data-controller-or-data-processor_en
- Official Journal
  - http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32016R0679&from=EN

Further Reading



- UK Information Commissioner's Office (ICO) Data Protection Act (DPA) document that helps determine if data is considered Personal Data. DPA is being superseded by GDPR:
  - https://ico.org.uk/media/for-organisations/documents/1554/determining-what-is-personal-data.pdf
  - DPA and GDPR
  - https://www.itgovernance.co.uk/data-protection
  - Anonymisation
    - https://ico.org.uk/media/for-organisations/documents/1061/anonymisation-code.pdf
- NHS in the UK document on Anonymisation and Pseudonymisation Standard:
  - https://www.nhsbsa.nhs.uk/sites/default/files/2018-03/NHSBSA%20Anonymisation%20and%20Pseudonymisation%20Standard.pdf

“Right to Erasure” and Blockchain



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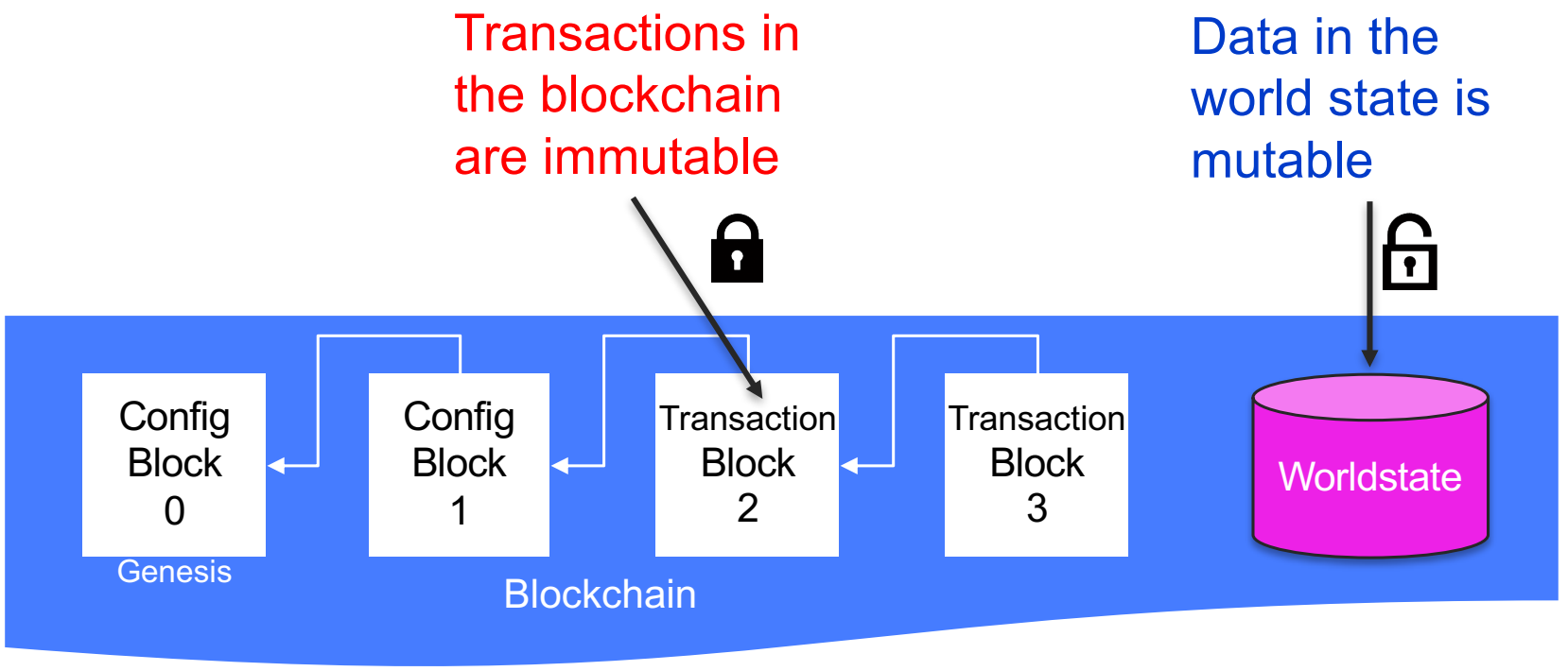
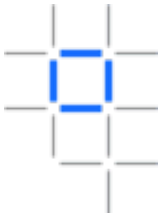
The “Right to Erasure” and blockchain

Enables an individual to request the deletion or removal of their personal data



Further Reading



- UK Information Commissioner's Office (ICO) "Right to Erasure" guidance:
  - https://ico.org.uk/for-organisations/guide-to-the-general-data-protection-regulation-gdpr/individual-rights/right-to-erasure

Hyperledger Fabric Block

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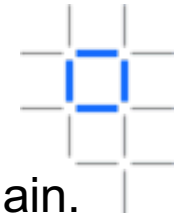
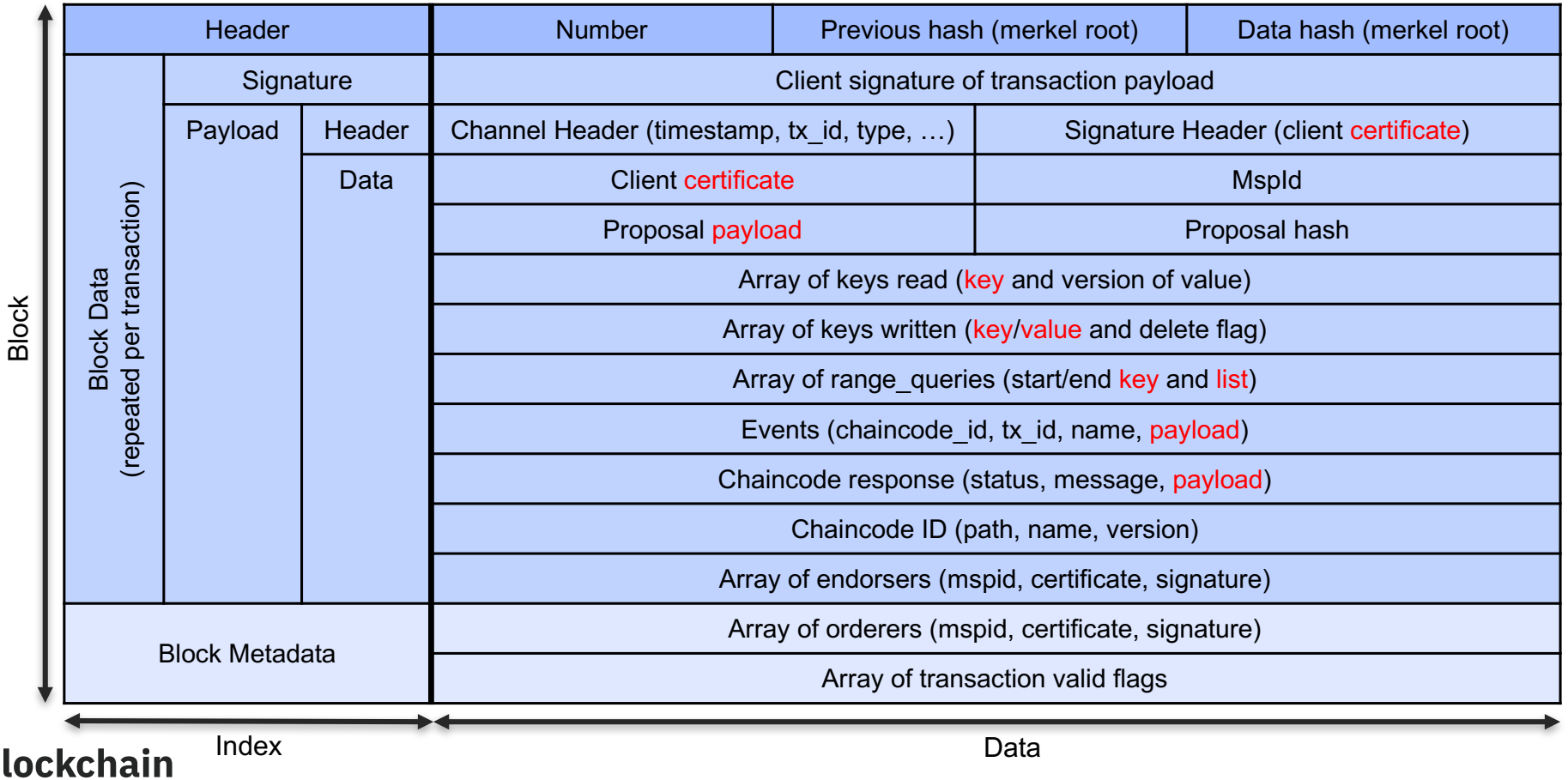
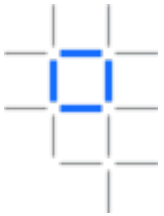
Summary of a Hyperledger Fabric Block



- Fields highlighted in red could potentially contain Personal Data recorded on the blockchain.



Block Fields and Personal Data



This slide describes the potential areas that Personal Data could be included in the block:

- **Proposal payload :** These are the transaction input arguments.
- **Client certificate:** If the client certificate is individual to a Data Subject then it could be considered PD.
- **Key:** The key written to or read from the world state. If PD is used in the key name then it will be included here.
- **Value:** The value of any keys written to the world state. If PD is used in the key value then it will be included here.
- **Events:** Events emitted from chaincode could include PD.
- **Chaincode response:** Any response from invoking the chaincode could include PD.

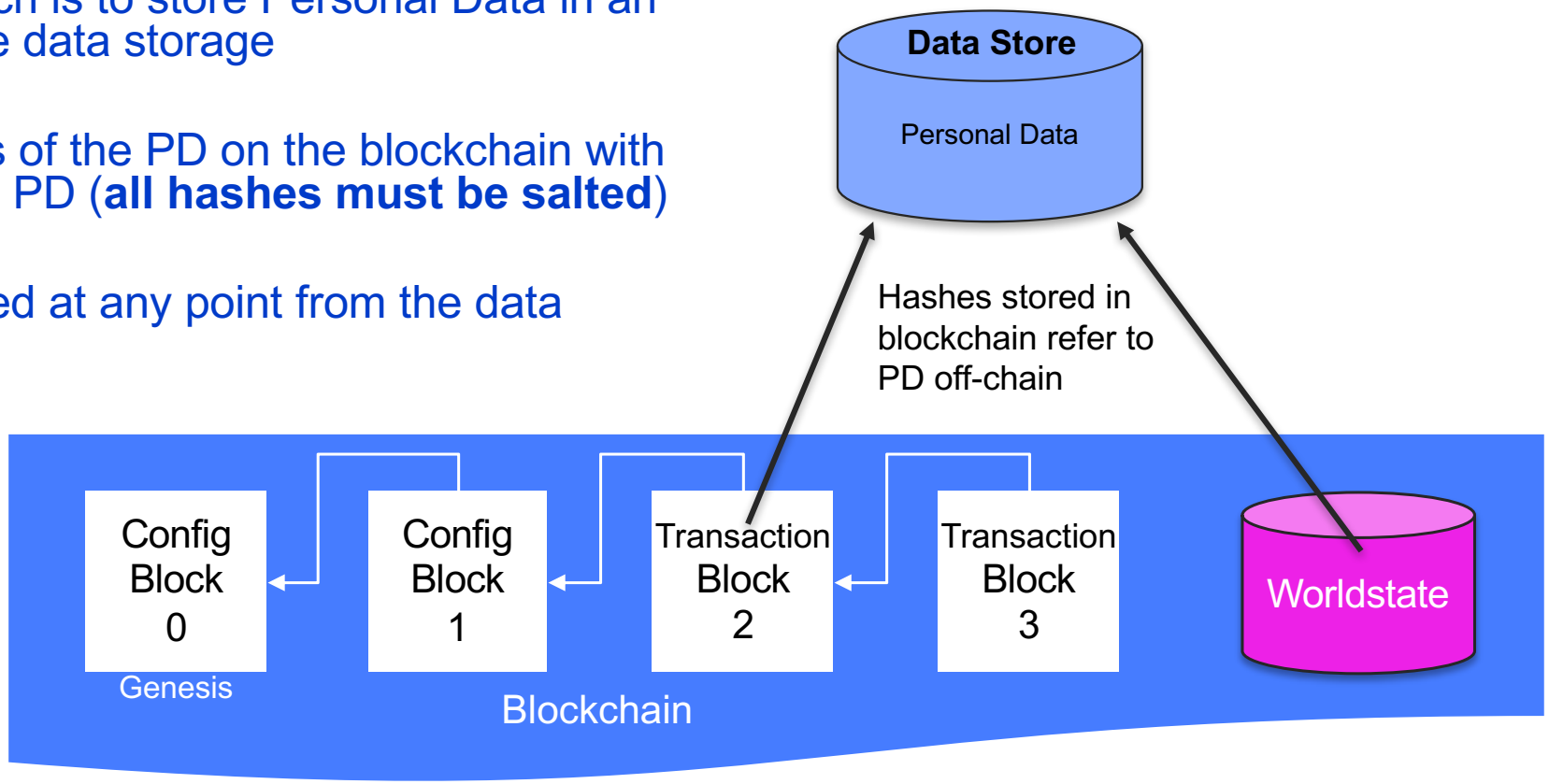
It is assumed that endorser and orderer certificates are issued to an organization and do not include Personal Data.

Remember that Fabric configuration blocks also contain certificates!

Solution

Solution – Store data off-chain

- **What**
  - The only approach is to store Personal Data in an off-chain mutable data storage
- **How**
  - Store only proofs of the PD on the blockchain with hashes linking to PD (**all hashes must be salted**)
- **Why**
  - PD can be deleted at any point from the data store(s)

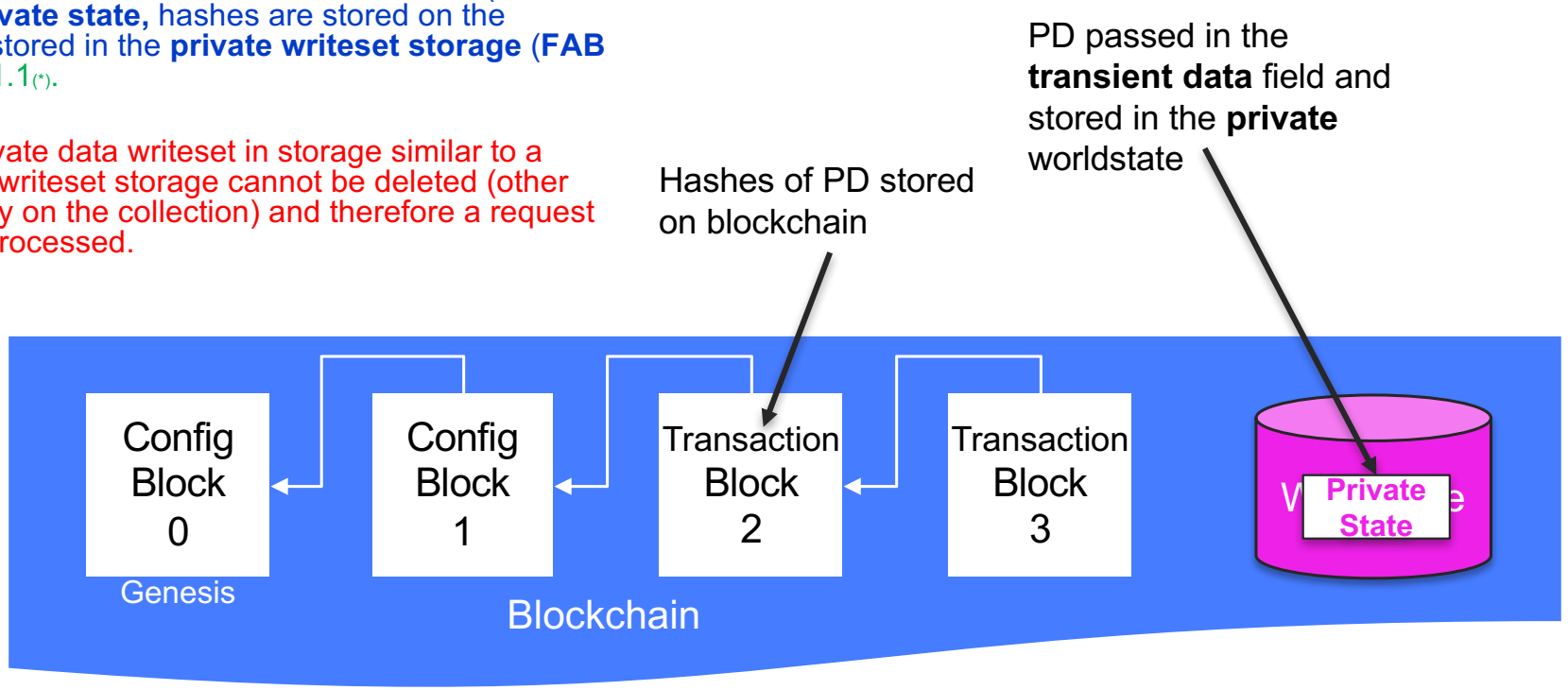


Non-Compliant Solutions

These are non-GDPR compliant

Store Personal Data in Private State (SideDB)

- **What**
  - Send Personal Data in transient part of blockchain transaction, save PD in private state and hashes on the blockchain
- **How**
  - PD is sent in the **transient data** field to the Smart Contract (**FAB 2450**), data stored in **private state,** hashes are stored on the channel and writeset is stored in the **private writeset storage** (**FAB 1151**). Requires Fabric 1.1(*).
- **Why not compliant**
  - FAB 1151 stores the private data writeset in storage similar to a blockchain. This private writeset storage cannot be deleted (other than a blockToLive policy on the collection) and therefore a request to erase PD cannot be processed.



(*) Experimental feature SideDB in Fabric 1.1 that requires recompilation.

Encrypt data

- **What**
  - Encrypt Personal Data before being stored on blockchain
- **How**
  - Public/Private Keys must be secured in a mutable data store
- **Why not compliant**
  - **Unproven for compliance with GDPR**