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VERAE TIME × ZAPIER

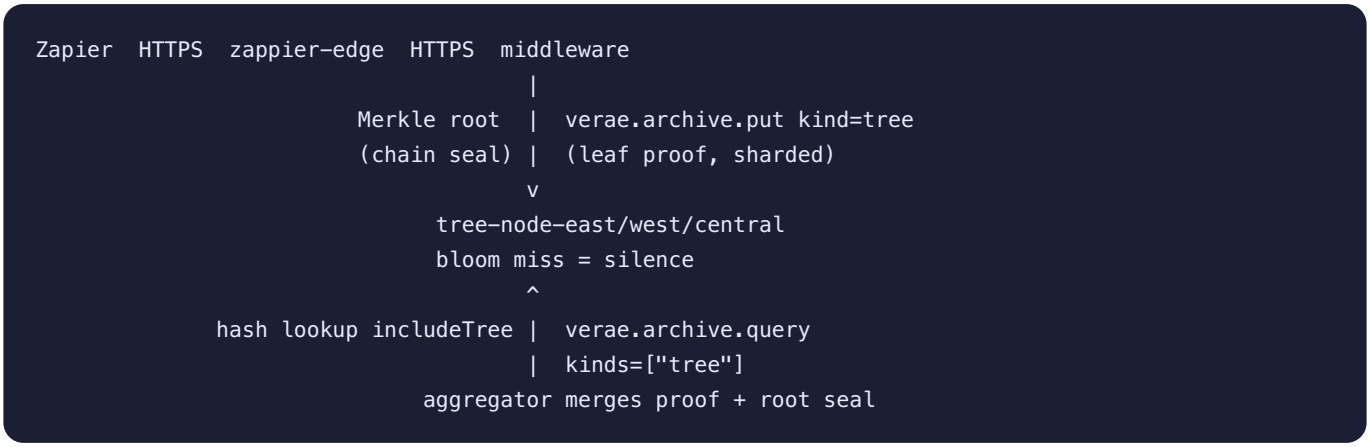
Tree nodes and bulk Merkle summaries

site/docs/02-architecture/tree-nodes.md

Tree nodes: bulk Merkle summaries vs itemized chain seals

The main Verae chain stores **hash + time + block + certificate**. A Zap that timestamps one document writes that document's SHA-256 as its own seal.

A **batch** of many documents is different: middleware builds a Merkle tree of the item hashes, seals **only the Merkle root** on the chain, and writes each **leaf proof** to external tree-node NATS archives. A later lookup of a member hash will **miss** on the central chain unless the Zap also queries tree nodes.



When to use which Zapier search

Search	Hits
Find Timestamp by SHA256	Hash was registered as its own chain seal
Find Hash (tree nodes + central chain)	Chain first, then `includeTree=true` broadcast

Receipt shape for a bulk leaf

```
{
  "sha256": "<leaf>",
  "exists": true,
  "itemizedOnMainChain": false,
  "merkleRoot": "<root sealed on chain>",
  "proofOk": true,
  "receipts": [
    { "kind": "seal", "of": "merkleRoot", "sha256": "<root>", "certificate": "…" },
    { "kind": "tree-leaf", "archiveId": "tree-node-east", "proof": […], "leafIndex": 1 }
  ]
}
```

Validate this path in the simulator (`packages/verae-zapier-simulator`) before pushing the Zapier app.