

Substrate Storage Repository

Fields in decl_storage!



Storage Key

paritytech/substrate



ChangeTrie



Trie

paritytech/trie



HashDB

Substrate Storage Crate

Fields in decl_storage!



Storage Key



ChangeTrie



Trie



HashDB

frame/support

primitives/state-machine

trie-db

hash-db

Substrate Storage

Fields in decl_storage!



Storage key

Example:

`substrate/frame/support/src/storage/generator/value.rs`


```
fn storage_value_final_key() -> [u8; 32] {  
    let mut final_key = [0u8; 32];  
    final_key[0..16].copy_from_slice(&Twox128::hash(Self::module_prefix()));  
    final_key[16..32].copy_from_slice(&Twox128::hash(Self::storage_prefix()));  
    final_key  
}
```

Substrate Storage

ChangeTrie

There are two fn generate change trie, fn call and fn contextual_call
In client/service/src/client/call_executor.rs

```
let changes_trie = backend::changes_tries_state_at_block(  
    id, self.backend.changes_trie_storage()  
)?;
```



Overlay change should be enabled, such that change trie will work

In state-machine/src/overlayed_changes/mod.rs

There is an api to **set_collect_extrinsics** but currently I am not total know how to enable the chaine tire for save the change trie

```
/// Ask to collect/not to collect extrinsics indices where key(s) has been changed.  
pub fn set_collect_extrinsics(&mut self, collect_extrinsics: bool) {  
    self.collect_extrinsics = collect_extrinsics;  
}
```

Substrate Storage

Trie



HashDB

Example: 0x26...

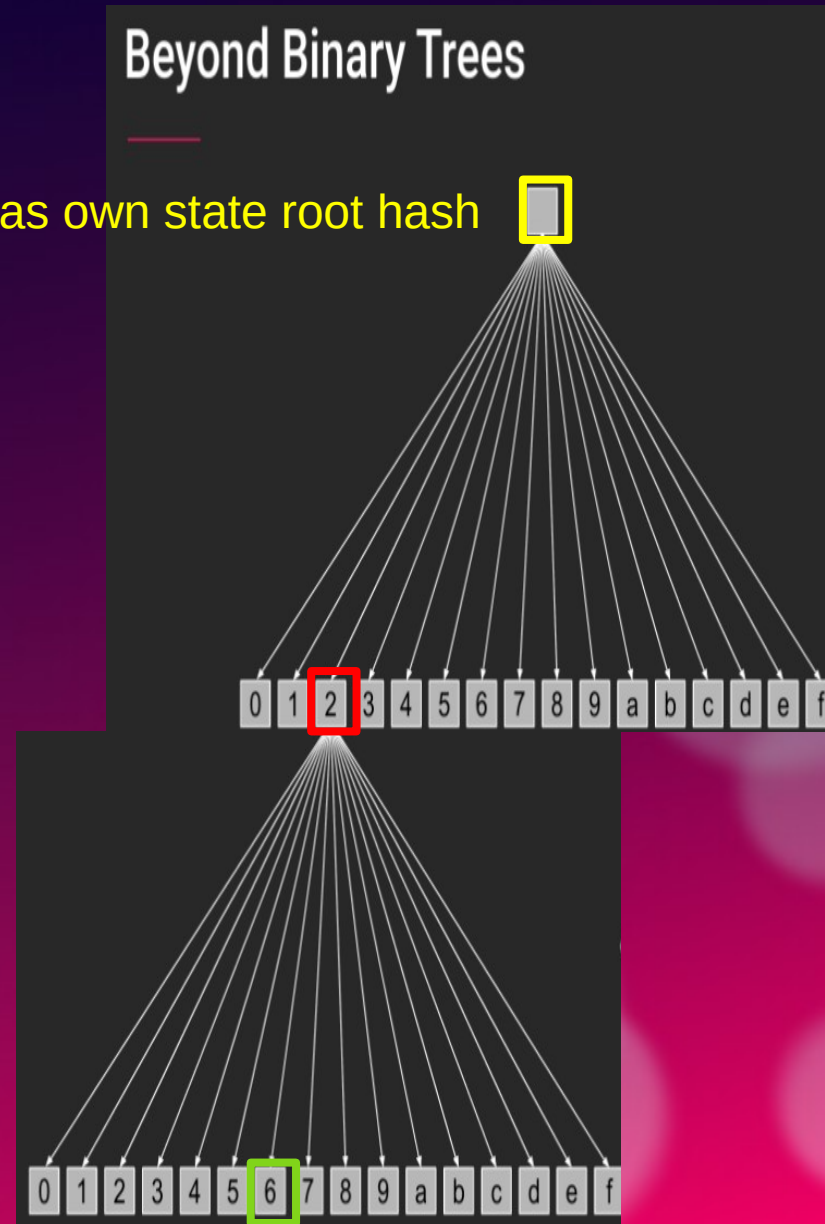
Generally every char in a position is a trie node

For example,

1st char 2 node

2nd char 6 node

Each block has own state root hash



Substrate Storage

Trie



HashDB

Example: 0x2612345678ab

Example: 0x2612345678ab

Example: 0x2612345678ac...

Partial - compression of
3rd char 1 node
4th char 2 node
5th char 3 node
... ..
10th char 8 node

Children - has two children

Example: 0x2612345678ab

Value

Example: 0x2612345678ab12..

- can be end and has value

Substrate Storage

Trie



HashDB

Trie Nodes

- Leaf
 - Value
- Branch
 - Value + Children
- NibbledBranch
 - Value + Partial + Children
- Extension
 - Value + Partial
- Empty

Substrate Storage



A **Key**, **Value** DB, can be RocksDB, Memory DB, SubDB

Value = encode(Trie Nodes)

Key = Hash(Value)

Substrate Storage

Fields in decl_storage!



Storage Key



ChangeTrie



Trie



HashDB

Know changing extrinsics

Know changing storage item

Know changing hash item

Substrate Storage

Fields in decl_storage!



Storage Key



ChangeTrie



Trie



HashDB

Know changing extrinsics

By Hash Table to know
the changing extrinsics

Know changing storage item

SSI

Know changing hash item



Substrate Storage

Fields in decl_storage!



Storage Key

Know changing extrinsics

Change Trie Solution



ChangeTrie

Directly know changes in extrinsics

Know changing storage item



Trie



HashDB

Know changing hash item

Substrate Storage

ChangeTrie Solution

- Make sure change trie is enabled
- Check there are storage -> changinge extrinsics map
- Expose change trie