DSbD Programme – Digital Catapult Cohort 2 Tier 1

KATLAS Technology

WEB3 - Privacy wallets

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CTO at KATLAS Technology

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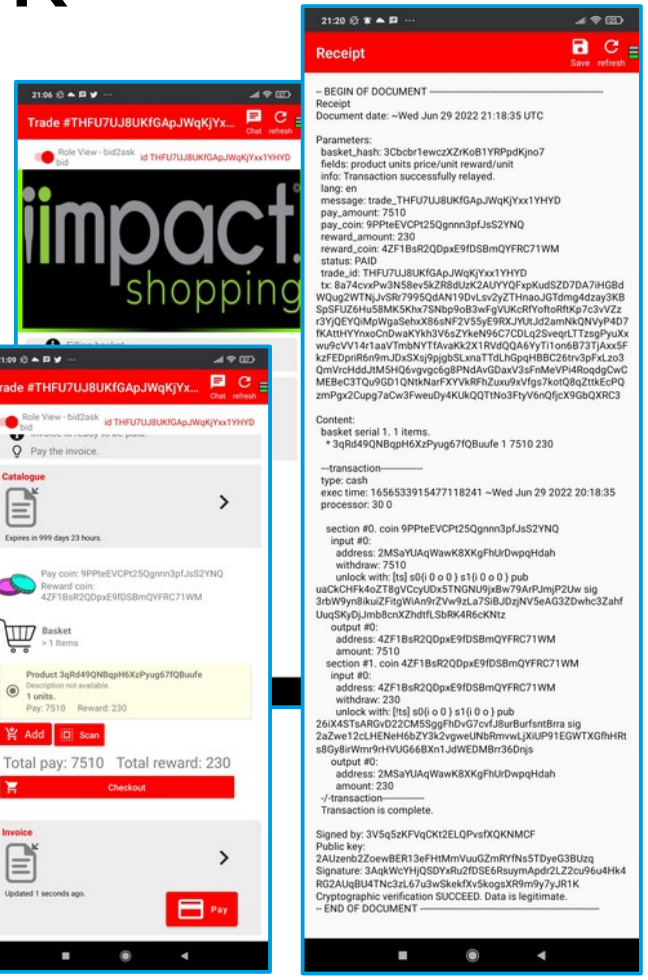
KATLAS network

- Cryptocurrency protocol. Settlement.
- Smart wallets with trading role-2-role trading protocols.



Source Code

GitHub

https://github.com/root1m3/plebble

Android App

Google play

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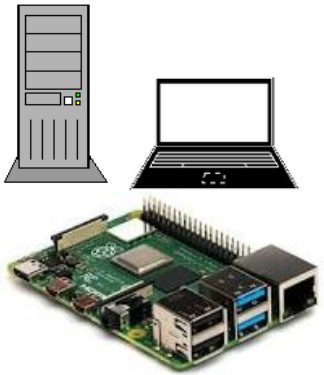
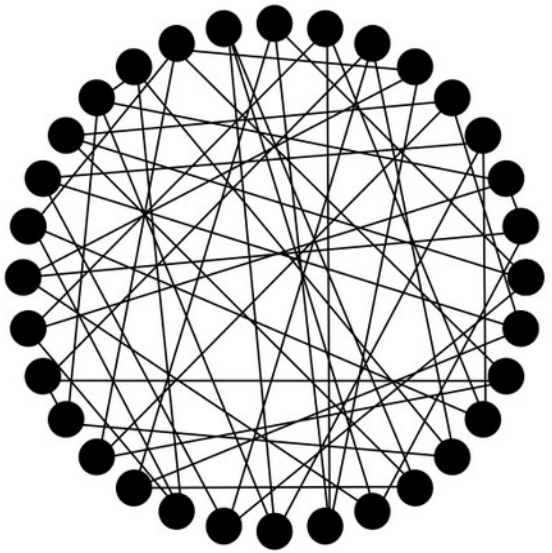
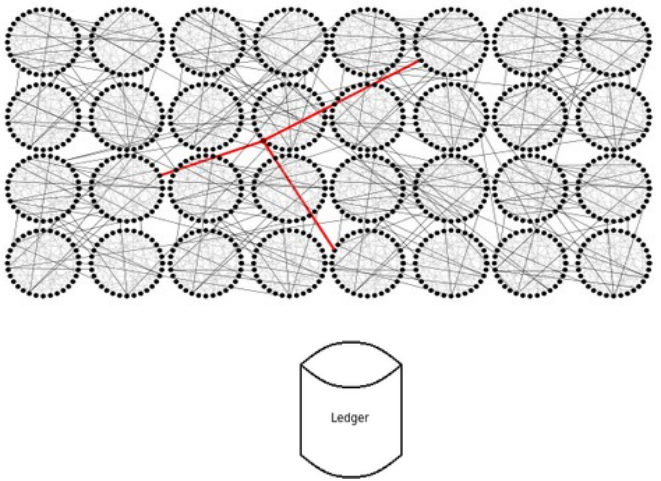


Node

P2P Network





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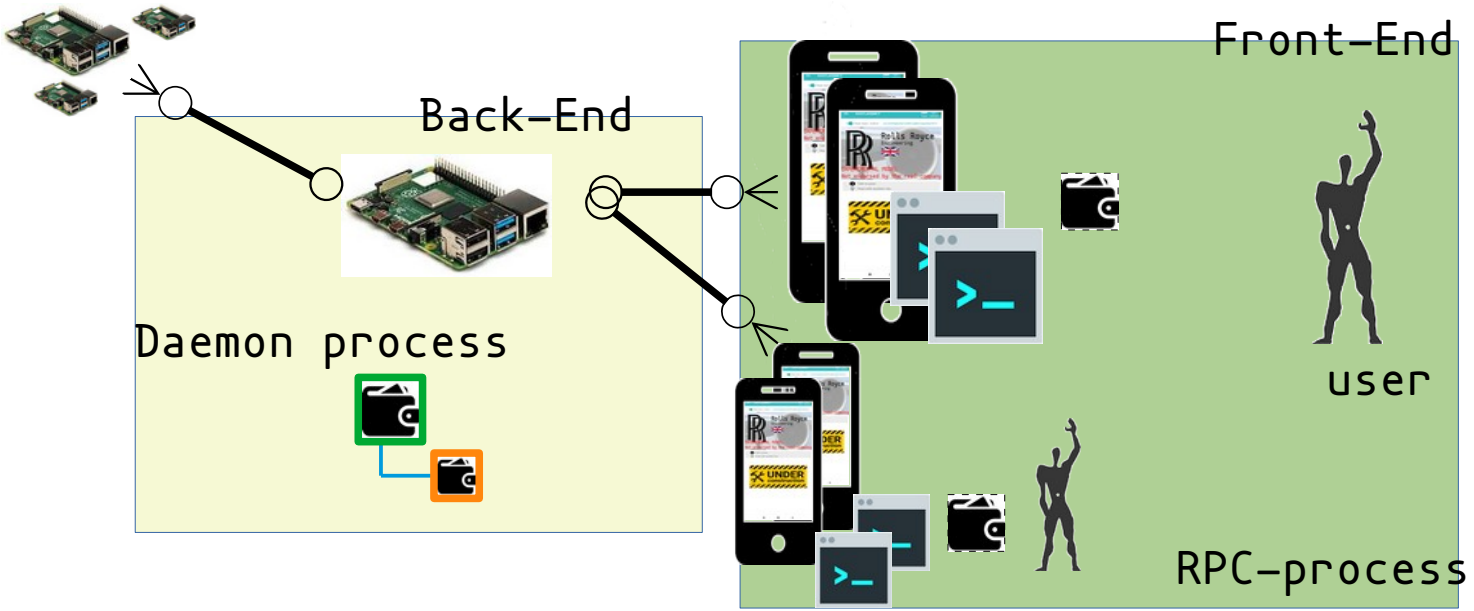
wallet



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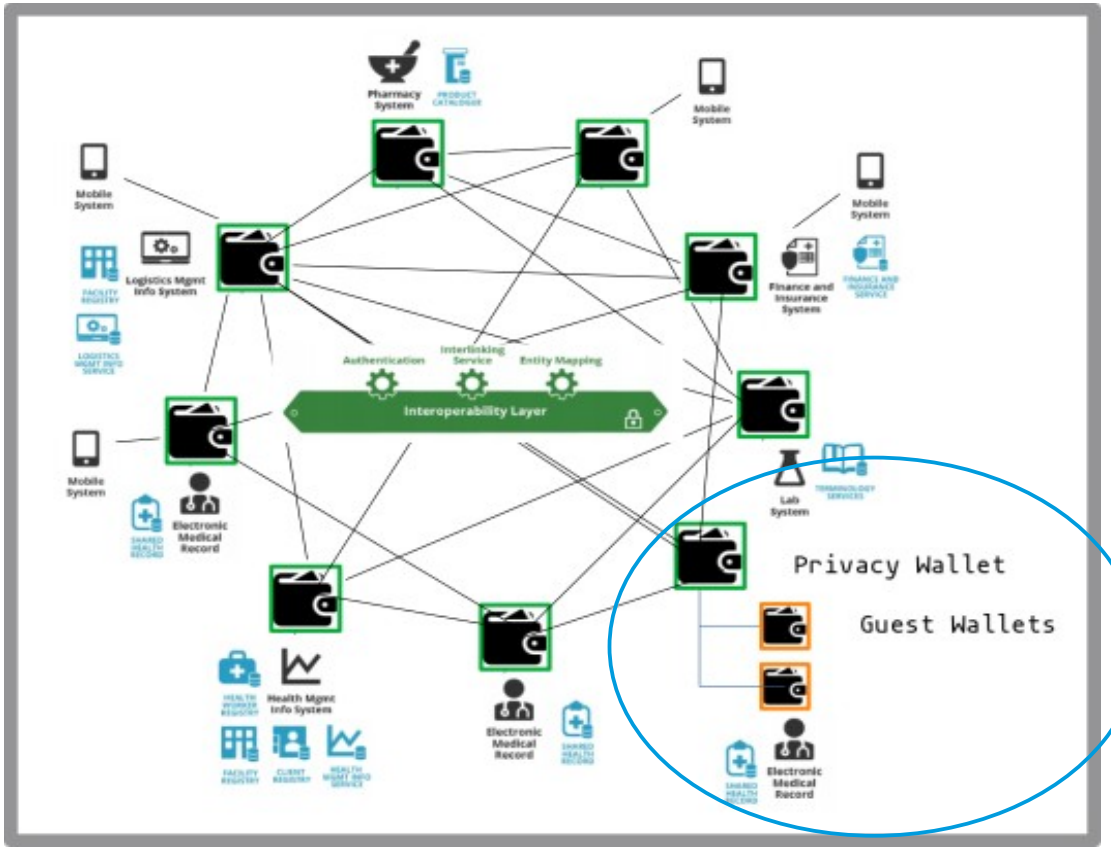

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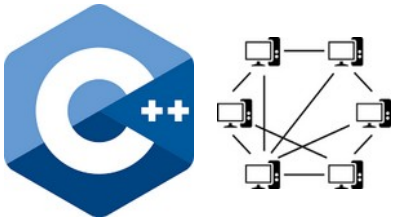

Daemon - user private data

- 1- User authentication → 64 bit id → Worker thread.
- 2- API request → Access to user wallet → Response

Risks:

- Code flaw could leak data from other user’s wallet.
- Today’s flawless code could contain a flaw tomorrow.

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System tests – purecap ~50K LoC

- RPC API calls
- Threads
- TCP/IP sockets
- Cryptography (ECC, DSA, AES, HASH)
- B58 Encoder/decoder. Binary serialization.
- String manipulation (trim, split, replace, ...)

Detected transmission of pointers via IPC. Got provenance failure exception.

Once fixed...

package zstd

- root@cheripleb:~ # zstd /etc/motd.template
- zstd: error 11 : Allocation error : not enough memory
- morello/cheribsd
- qemu-riskv64-purecap/cheribsd

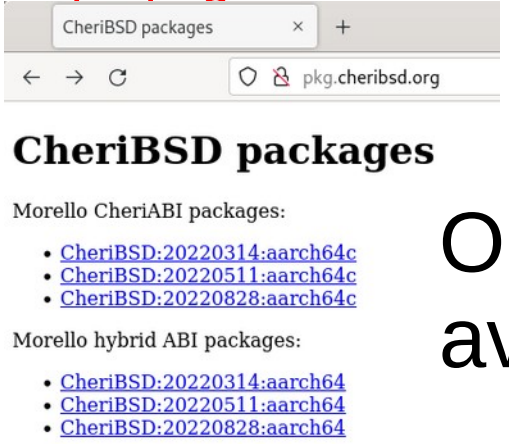
cheribuild.py - riscv

git clone https://github.com/CTSRD-CHERI/cheribuild

./cheribuild.py run-riscv64-purecap -d

root@cheribsd-riscv64-purecap:~# **pkg64c install** git

Error fetching http://pkg.CheriBSD.org/CheriBSD:20220828:riscv64c/Latest/pkg.txz



Only aarch64/aarch64c ports are available

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wallet

CHERI / CheriBSD / Morello

Risks we'd like to reduce using compartmentalization:

- Code flaw could leak data from other user's wallet.
- Today's flawless code could contain a flaw tomorrow.

- How to guarantee that users can only access the right wallet...
- Even when evil users take advantage of current (or future) flaws in the code, gaining -anyhow- access to other's wallet.

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Compartmentalization models

CHERI / CheriBSD / Morello

- Shared library compartments.
  We need more granularity → C++ Objects.

- Enclaves, Protection domains, trampolines
  Requires a significant software refactoring effort.
  → allocators, sealed capabilities

- We are figuring out how to achieve a model that:
  mitigates aforementioned risks
  minimizes development effort, easiest change

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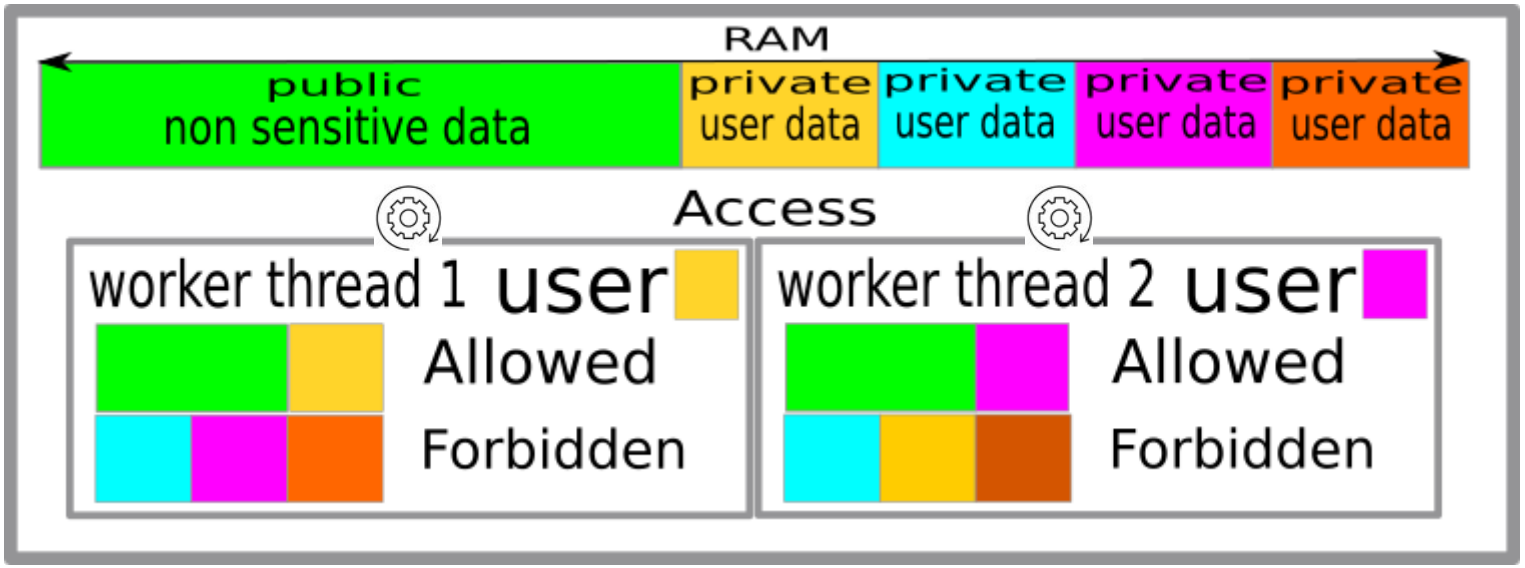

Coloured compartments

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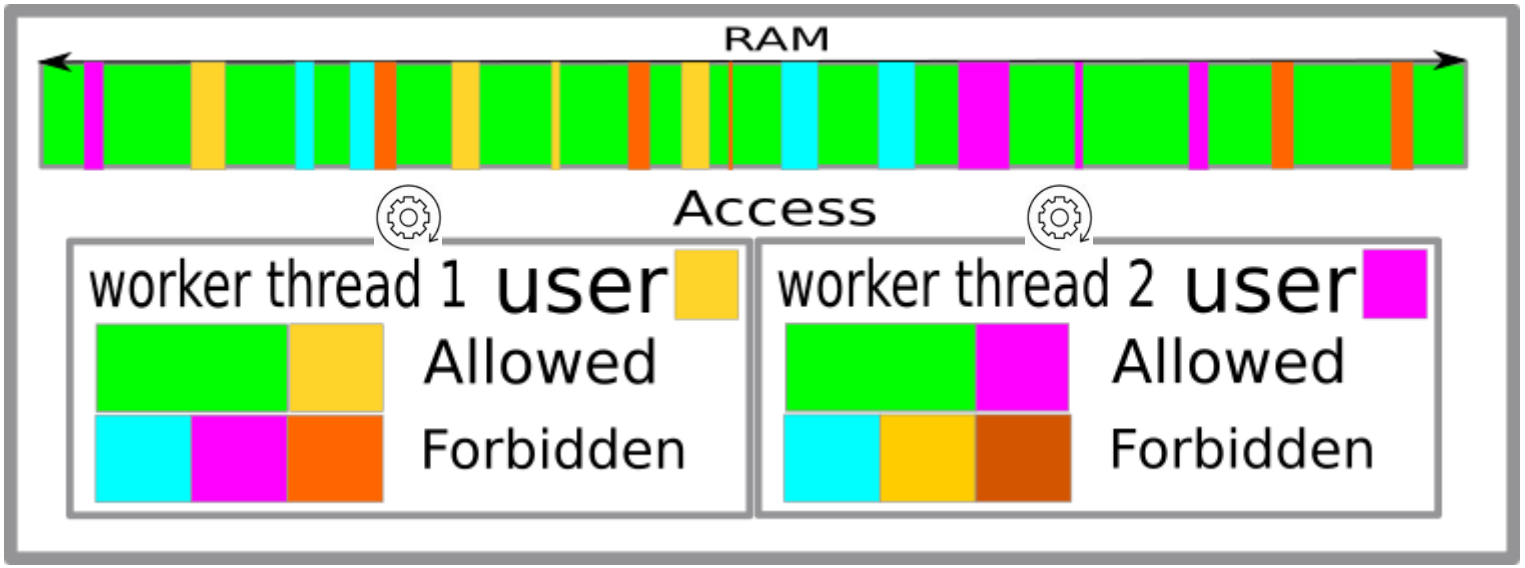

Coloured fragmented compartments

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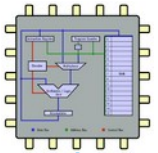
CPU

RAM

Execution thread



Load 64 bit id into register

New C++ object – **encode** id

Access/dereference
C++ object

Reg Id !- cap Id ?

→

raise PROT Exception

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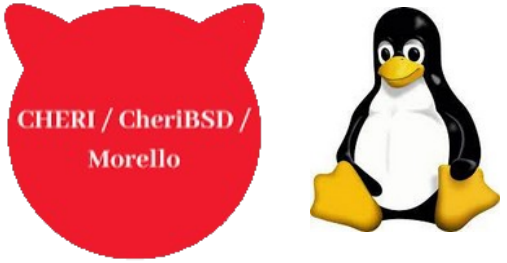
Continuity

- Privacy++ wallets
  featuring compartmentalized wallets with CHERI



- KATLAS W3 Privacy router.

  Internet router + P2P Node + family/business wallets in one computer.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Thank you !
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