

Premium BOT

by Kint0Sens

part of the TRADING/ARBITRAGE BOTS bounty (<https://github.com/interlay/bounties/issues/2>) Contact: Discord Kint0Sens#9101

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The Premium BOT repository is a fork of the [interlay/interbtc-clients](#). All the modifications are licensed under the Apache License, Version 2.0. See the `LICENSE_PREMIUM_BOT` file.

Project Repository

<https://github.com/Kint0Sens/interbtc-clients-cli> The Premium BOT repository is a fork of the [interlay/interbtc-clients](#). The PremiumBot code is available in the branch `premium-bot-1.12.0` (<https://github.com/Kint0Sens/interbtc-clients-cli/tree/premium-bot-1.12.0>)

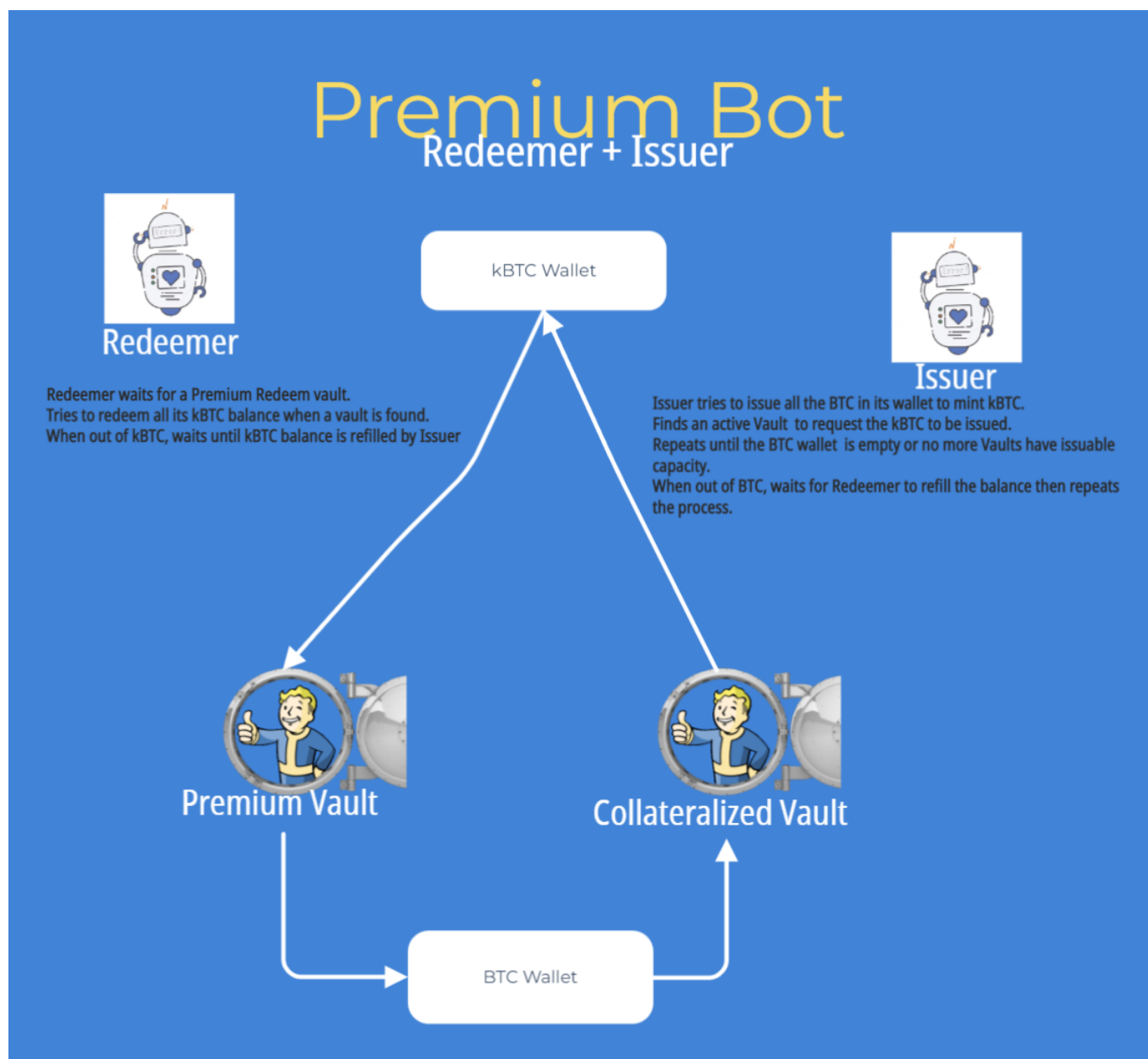
Video presentation

https://youtu.be/_ZvEypJZYjQ

Overview

The Premium BOT is composed of two binaries, the Redeemer and the Issuer. They are supposed to be run in parallel. The Redeemer consumes KBTC[^1] and generates BTC when a vault offers premium redeems. The Issuer consumes BTC and refills the Redeemer KBTC balance by sending issue requests.

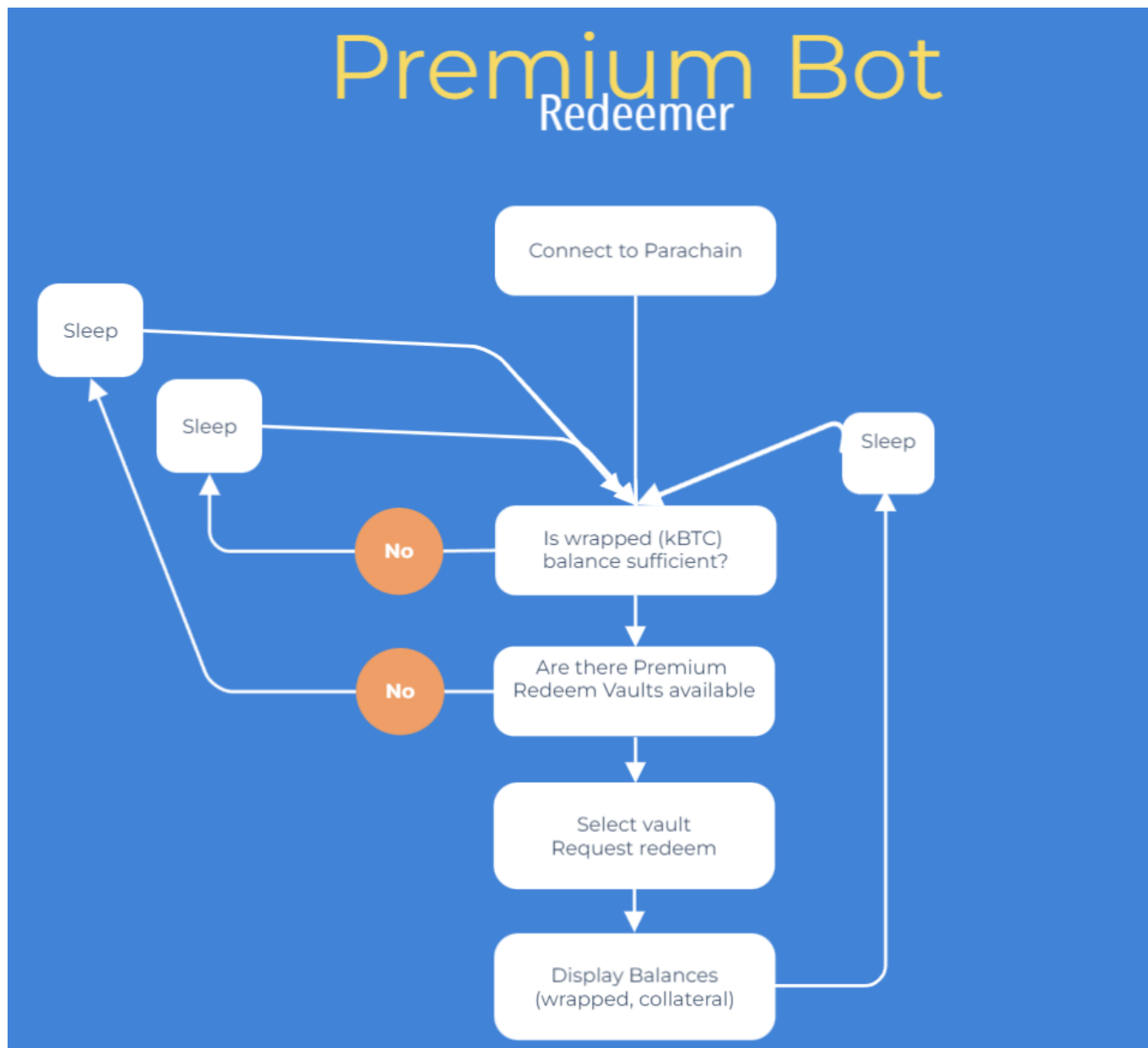
The Premium BOT is written in Rust as an fork of the interbtc-clients repository of interlay.



The Redeemer

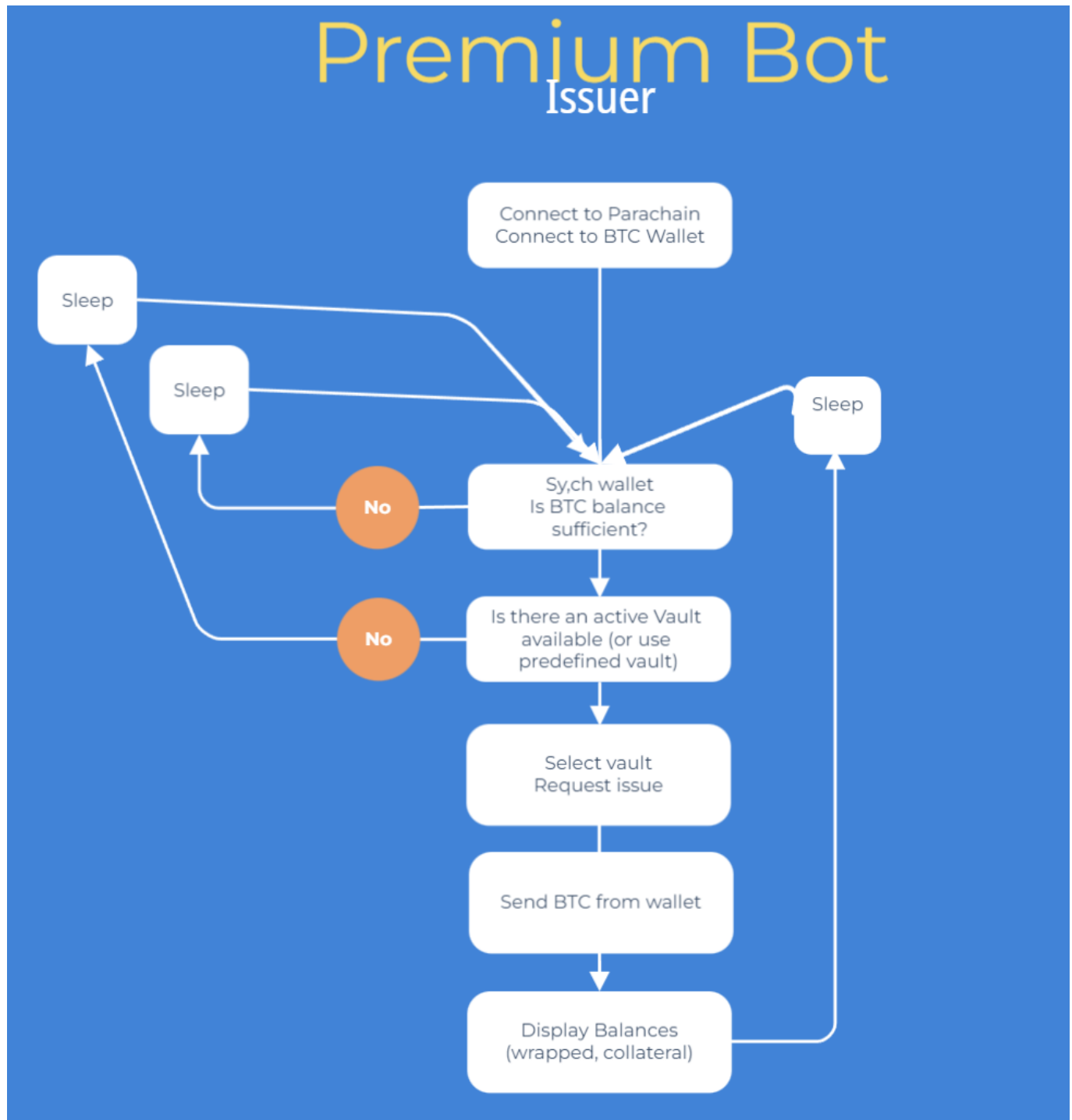
The purpose of the Redeemer is to monitor vaults for Premium Redeem opportunities and then request premium redeems with as much of its kBTC balance as possible and transfer BTC in the Issuer's BTC Wallet.

The Redeemer will monitor the active vaults until it finds a vault that offers Premium Redeem due to its collateralization level. Once found it will request a premium redeem of the maximum available amount (limited by the bot's own kBTC balance). Once the Redeemer has run out of kBTC balance it will stay idle until its balance is refilled and then it will resume searching for Premium Redeem Vaults.



The Issuer

The purpose of the Issuer is to select a vault with issuable capacity and send issue request to it in order to consume BTC and fill the kBTC account of the Redeemer. The Issuer will repeat this as long as it has BTC Balance and as long as it finds a vault with some kBTC capacity. It will then be idle until its BTC balance is refilled again by the Redeemer.



Typical Use case

The use case of the Premium BOT is the following:

A user provides an account on the Intrelay parachain (the BOT Interlay Account) with a certain amount of KBTC and some native KINT to pay for gas. Under ideal conditions the amount allocated need not be very large as the KBTC redeemed into BTC are supposed to return to the KBTC wallet via the action of the Issuer.

Technical details

The Premium Bot is composed of two command line binaries. It is written in Rust as a fork of the interlay/interbtc-clients repository. It uses some of the extrinsics and rpc functions provided in the runtime/rpc library of interbtc-clients, but we also needed to add some new rpc calls like `get_premium_redeem_vaults`.

To interact with the Bitcoin network we used the Bitcoin Dev Kit^[^2] libraries that provide tools to generate an in memory BTC wallet and to sent BTC transactions.

Issues and possible next steps

Due to lack of time, some issues have been identified but not yet resolved. There are also some ideas to improve the Premium BOT.

- **Create a 'personalized' BTC wallet** In the current release the bitcoin wallet created when running the PremiumBOT is always called "PremiumBotWallet-master". In a future release, the name of the Bot Walled will be linked to the address of the parachain account stored in the keyfile.json
- **Include an integration test to simulate Premium Vaults.** Without an integration/mockup setup, it is not possible to completely test the Premium BOT as it requires vaults to be in Premium Redeem state. To mitigate this, we added an option to the Redeemer that will consider all vaults, with their redeemable capacity as Premium.
- **Include some external logging / alerting mechanism** This would be useful for the bot operator to be informed of the activity of the bot.
- **Do not display bitcoin core RPC user and password** We initially followed the same approach as with vaults, where the Bitcoin Core RPC user and password are part of the command line options. IN a future version we will configure a json file with the user and password.
- **Define default rpc url in the code** In the current release the `--bitcoin-rpc-url` parameter is mandatory. A future release would define the default url in the code (different values based on the testnet/kintsugi build) and make `--bitcoin-rpc-url` optional.

How to build

Please read the prerequisites provided in the README_interlay.md file about how to build the interbtc-clients repository. Building the Premium BOT repository uses exactly the same process. You only need to select the correct branch.

At the time of release of the project (20/6/2022) the main branch on Testnet and Kintsugi is 1.12.0 The corresponding Premium BOT branch is premium-bot-1.12.0 (<https://github.com/Kint0Sens/interbtc-clients-cli/tree/premium-bot-1.12.0>).

In the root of the repository you will find 3 build scripts. They call cargo build --release with the appropriate feature (testnet/kintsugi or interlay) + specify a distinct target directory. For instance the build_kintsugi script is

```
cargo build --release --features parachain-metadata-kintsugi --target-dir
./target/kintsugi
```

Running the Issuer:

The examples here are for testnet. Adapt the path to the binary for the kintsugi network

```
./target/testnet/release/issuer
```

Command options and flags:

-v, --verbose

Returns a verbose log

--vault-account-id <VAULT_ACCOUNT_ID>

By default the Issuer will select a vault with sufficient capacity. For testing purposes, or in case the Bot is linked to a vault account that is set to accept only its own accounts requests (set to inactive), the user might prefer to explicitly specify the target vault with this option.

--sleeptime-main-loop <SLEEPTIME_MAIN_LOOP>

--sleeptime-no-issuable-vault <SLEEPTIME_NO_ISSUABLE_VAULT>

--sleeptime-not-enough-btc <SLEEPTIME_NOT_ENOUGH_BTC>

--sleeptime-wait-for-btc-transfer <SLEEPTIME_WAIT_FOR_BTC_TRANSFER>

By default the Issuer will pause 15 seconds after every loop and after determining that its BTC balance is insufficient or that no eligible vault is available. The issuer will also check for BTC confirmations and wait 120 seconds between successive checks. The above options allow the user to fine tune these idle times

--min-btc-balance <MIN_BTC_BALANCE> The minimum amount in satoshis allowed for the Issuer to generate an issue request, must be greater than Bridge Fee + BTC Network Fee + BTC Dust Limit [default: 5000]

--max-issue-amount <MAX_ISSUE_AMOUNT> The maximum amount in satoshis allowed for an individual issue request generated by the Issuer. The actual issue request will be max between this value and the greater available vault issuable capacity [default: 3000]

--min-issue-amount <MIN_ISSUE_AMOUNT>

--wait-for-issued-kbtc Issuer will pause after executing the BTC payment to wait for the KBTC to be minted by the vault. A check is done every <SLEEPTIME_MAIN_LOOP> seconds on the balance of the bot account on the parachain

--btc-network-confirmations issuer will pause after sending the BTC transaction until **btc_network_confirmations** confirmations have been reached. If set to 0 no checks are done after the transfer of BTC. But balances on the account are still evaluated with at least 1 confirmation.

-- keyfile

-- keyname

The Redeemer and Issuer will read the Kintsugi account information from a json file. Unless specified in a commandline option, the issuer and redeemer binaries look for a file named **keyfile.json** in the current

directory. In the file the entry with the correct keyname is read. By default the keyname is **keyname**. You can override these defaults with a commandline option.

This file should contain the Kintsugi account of the BOT. You should follow the same syntax as the keyfile for vault accounts^[^3].

Example execution of the Issuer

The below output is run with the default settings so no command option needed to be entered. It is a Interlay Testnet execution as mentioned in the log. The bitcoin core is accessed via localhost:18332. For the demo and the documentation we used user **premium** and password **botbotbot** as an example. You should define you own user/password.

Command to run the Issuer:

```
~/int/my-interbtc-clients-cli$ ./target/testnet/release/issuer \
--bitcoin-rpc-url http://localhost:18332 \
--bitcoin-rpc-user premium \
--bitcoin-rpc-pass botbotbot
```

Output

```
[2022-06-11T15:55:07Z INFO issuer] Connected to Interlay Testnet parachain
[2022-06-11T15:55:07Z INFO issuer] -----
[2022-06-11T15:55:07Z INFO issuer] Connected to bitcoin Testnet network
[2022-06-11T15:55:07Z INFO issuer] -----
[2022-06-11T15:55:07Z INFO issuer] Automatic selection of vault
[2022-06-11T15:55:07Z INFO issuer] Signer:
5GTH76cE3vQyehe5w2Q9si4nxZ1izyvQzB6WezCSJGTKxwCU
[2022-06-11T15:55:07Z INFO issuer] Max issue amount:          15000 KBTC sat
[2022-06-11T15:55:07Z INFO issuer] Min BTC balance:          5000 KBTC sat
[2022-06-11T15:55:07Z INFO issuer] 1 BTC confirmations required
[2022-06-11T15:55:08Z INFO issuer] Initial wrapped balance: 7166548 KBTC sat
[2022-06-11T15:55:08Z INFO issuer] Initial native balance: 340767149729 KINT
planck
[2022-06-11T15:55:08Z INFO issuer] Initial BTC balance:      87549 BTC sat
[2022-06-11T15:55:08Z INFO issuer] [1]-----
[2022-06-11T15:55:08Z INFO issuer] Sufficient BTC balance to attempt issues
[2022-06-11T15:55:08Z INFO issuer] Max BTC issue amount for this iteration: 10000
[2022-06-11T15:55:10Z INFO issuer] Selected vault
5F7Q9FqnGwJmjLtsFGymHZXPEx2dWRVE7NW4Sw2jzEhUB5WQ with issuable amount of 43890516
KBTC
[2022-06-11T15:55:43Z INFO issuer] Sending issue request for 10000 BTC sat to
parachain
[2022-06-11T15:55:43Z INFO issuer] Issue request accepted
[2022-06-11T15:55:43Z INFO issuer] Issue BTC address:
tb1qjtjxea3yhfpvzzgfp0zjxfltr3swqpsz0qqpauj
[2022-06-11T15:55:43Z INFO issuer] Issue amount:          9985 KBTC sat
[2022-06-11T15:55:43Z INFO issuer] Issue fee:          15 KBTC sat
[2022-06-11T15:55:43Z INFO issuer] Building BTC transaction
```

```
[2022-06-11T15:55:43Z INFO issuer] Transaction sent. TxID:
25b55cc1a1a86d85f0e26fb248b976d336ee0cf4683dfc8db6a52b86e016f9da
[2022-06-11T15:55:43Z INFO issuer] Not waiting for parachain KBTC issue
confirmation. KBTC balance and delta might be incorrect
[2022-06-11T15:55:43Z INFO issuer] Waiting for 1 confirmations on bitcoin testnet
network
[2022-06-11T16:11:44Z INFO issuer] Received 1/1 confirmations
[2022-06-11T16:11:44Z INFO issuer] Wrapped balance:          7166548 KBTC sat
[2022-06-11T16:11:44Z INFO issuer] Native balance:           337685378527 KINT
planck
[2022-06-11T16:11:44Z INFO issuer] BTC balance:              104969 BTC sat
[2022-06-11T16:11:44Z INFO issuer] Delta wrapped balance: 0 KBTC sat
[2022-06-11T16:11:44Z INFO issuer] Delta native balance:   -3081771202 KINT planck
[2022-06-11T16:11:44Z INFO issuer] Delta BTC balance:       17420 BTC sat
[2022-06-11T16:11:44Z INFO issuer] Waiting 15 seconds before next loop iteration
[2022-06-11T16:11:59Z INFO issuer] [2]-----
[2022-06-11T16:11:59Z INFO issuer] Sufficient BTC balance to attempt issues
[2022-06-11T16:11:59Z INFO issuer] Max BTC issue amount for this iteration: 10000
[2022-06-11T16:12:02Z INFO issuer] Selected vault
5F7Q9FqnGwJmjLtsFGymHZXPEx2dWRVE7NW4Sw2jzEhUB5WQ with issuable amount of 44022496
KBTC
[2022-06-11T16:12:41Z INFO issuer] Sending issue request for 10000 BTC sat to
parachain
[2022-06-11T16:12:41Z INFO issuer] Issue request accepted
[2022-06-11T16:12:41Z INFO issuer] Issue BTC address:
tb1q7ylq53gvkxfhm3pkjyjav0hhqjctwrpc9fgmpc
[2022-06-11T16:12:41Z INFO issuer] Issue amount:           9985 KBTC sat
[2022-06-11T16:12:41Z INFO issuer] Issue fee:              15 KBTC sat
[2022-06-11T16:12:41Z INFO issuer] Building BTC transaction
[2022-06-11T16:12:42Z INFO issuer] Transaction sent. TxID:
0b71ba851876de27138e65b657560526bf6f138af0b67f389b0b4bd16893934c
[2022-06-11T16:12:42Z INFO issuer] Not waiting for parachain KBTC issue
confirmation. KBTC balance and delta might be incorrect
[2022-06-11T16:12:42Z INFO issuer] Waiting for 1 confirmations on bitcoin testnet
network
[2022-06-11T16:16:54Z INFO issuer] Received 1/1 confirmations
[2022-06-11T16:16:54Z INFO issuer] Wrapped balance:          7130503 KBTC sat
[2022-06-11T16:16:54Z INFO issuer] Native balance:           337033931527 KINT
planck
[2022-06-11T16:16:54Z INFO issuer] BTC balance:              92149 BTC sat
[2022-06-11T16:16:54Z INFO issuer] Delta wrapped balance: -36045 KBTC sat
[2022-06-11T16:16:54Z INFO issuer] Delta native balance:   -651447000 KINT planck
[2022-06-11T16:16:54Z INFO issuer] Delta BTC balance:       -12820 BTC sat
[2022-06-11T16:16:54Z INFO issuer] Waiting 15 seconds before next loop iteration
[2022-06-11T16:17:09Z INFO issuer] [3]-----
[2022-06-11T16:17:09Z INFO issuer] Sufficient BTC balance to attempt issues
[2022-06-11T16:17:09Z INFO issuer] Max BTC issue amount for this iteration: 10000
[2022-06-11T16:17:12Z INFO issuer] Selected vault
5F7Q9FqnGwJmjLtsFGymHZXPEx2dWRVE7NW4Sw2jzEhUB5WQ with issuable amount of 44012496
KBTC
[2022-06-11T16:17:54Z INFO issuer] Sending issue request for 10000 BTC sat to
parachain
[2022-06-11T16:17:54Z INFO issuer] Issue request accepted
[2022-06-11T16:17:54Z INFO issuer] Issue BTC address:
```



```

tb1qmuycxjjnnpjg86yx4qtm7m82x5g2fjuf4dcsa
[2022-06-11T16:17:54Z INFO issuer] Issue amount:      9985 KBTC sat
[2022-06-11T16:17:54Z INFO issuer] Issue fee:        15 KBTC sat
[2022-06-11T16:17:54Z INFO issuer] Building BTC transaction
[2022-06-11T16:17:55Z INFO issuer] Transaction sent. TxID:
b6a5e01fa6dcba4b08f972e308035b4f342c5c845fdbaf4e12c4170814690a9
[2022-06-11T16:17:55Z INFO issuer] Not waiting for parachain KBTC issue
confirmation. KBTC balance and delta might be incorrect
[2022-06-11T16:17:55Z INFO issuer] Waiting for 1 confirmations on bitcoin testnet
network

```

Example execution of the Issuer on Kintsugi chain

```

./target/kintsugi/release/issuer
--bitcoin-rpc-url http://localhost:8332
--bitcoin-rpc-user premium
--bitcoin-rpc-pass botbotbot
--keyfile ../kintsugi_bot_test/keyfile.json
--max-issue-amount 100000
--sleeptime-not-enough-btc 200 [2022-06-16T04:55:00Z INFO issuer] Connected to Kintsugi parachain
[2022-06-16T04:55:00Z INFO issuer] ----- [2022-06-16T04:55:00Z INFO issuer]
Connected to bitcoin Bitcoin network [2022-06-16T04:55:00Z INFO issuer] -----
[2022-06-16T04:55:00Z INFO issuer] Automatic selection of vault [2022-06-16T04:55:00Z INFO issuer]
Signer: 5DkmTr3NeLPkQqefuU7QMjHJsoso8vbDQbiTEFjCae2ecpK [2022-06-16T04:55:00Z INFO issuer]
Max issue amount: 100000 KBTC sat [2022-06-16T04:55:00Z INFO issuer] Min BTC balance: 5000 KBTC
sat [2022-06-16T04:55:00Z INFO issuer] 1 BTC confirmations required [2022-06-16T04:55:01Z INFO
issuer] Initial wrapped balance: 0 KBTC sat [2022-06-16T04:55:01Z INFO issuer] Initial native balance:
135228667210 KINT planck [2022-06-16T04:55:01Z INFO issuer] Initial BTC balance: 0 BTC sat [2022-06-
16T04:55:01Z INFO issuer] [1]----- [2022-06-16T04:55:01Z WARN issuer]
Insufficient BTC balance: 0 BTC sat [2022-06-16T04:55:01Z INFO issuer] Waiting 200 seconds before
checking again [2022-06-16T04:58:35Z INFO issuer] [2]----- [2022-06-
16T04:58:35Z WARN issuer] Insufficient BTC balance: 0 BTC sat [2022-06-16T04:58:35Z INFO issuer]
Waiting 200 seconds before checking again [2022-06-16T05:02:09Z INFO issuer] [3]-----
----- [2022-06-16T05:02:09Z WARN issuer] Insufficient BTC balance: 0 BTC sat [2022-06-
16T05:02:09Z INFO issuer] Waiting 200 seconds before checking again [2022-06-16T05:05:44Z INFO
issuer] [4]----- [2022-06-16T05:05:44Z WARN issuer] Insufficient BTC balance: 0
BTC sat [2022-06-16T05:05:44Z INFO issuer] Waiting 200 seconds before checking again [2022-06-
16T05:09:18Z INFO issuer] [5]----- [2022-06-16T05:09:18Z WARN issuer]
Insufficient BTC balance: 0 BTC sat [2022-06-16T05:09:18Z INFO issuer] Waiting 200 seconds before
checking again [2022-06-16T05:12:52Z INFO issuer] [6]----- [2022-06-
16T05:12:52Z INFO issuer] Sufficient BTC balance to attempt issues [2022-06-16T05:12:52Z INFO issuer]
Max BTC issue amount for this iteration: 27255 [2022-06-16T05:12:56Z INFO issuer] Selected vault
a3e2AF9D4WUhuZPZvNiAkW2eWGLfMWQfBYWzwgk8bhmHF3LDc with issuable amount of 12342
KBTC [2022-06-16T05:13:45Z INFO issuer] Sending issue request for 12342 BTC sat to parachain [2022-
06-16T05:13:45Z INFO issuer] Issue request accepted [2022-06-16T05:13:45Z INFO issuer] Issue BTC
address: bc1qq12gs04spsttwhmq37v2rewxk6vt08eycuf3n [2022-06-16T05:13:45Z INFO issuer] Issue
amount: 12323 KBTC sat [2022-06-16T05:13:45Z INFO issuer] Issue fee: 19 KBTC sat [2022-06-

```

```

16T05:13:45Z INFO issuer] Building BTC transaction [2022-06-16T05:13:45Z INFO issuer] Transaction
sent. TxID: 6d5c4c36978c0c88d0475ae0f2202bed999ede04d0b7a446e44c1999f5e55d6d [2022-06-
16T05:13:45Z INFO issuer] Not waiting for parachain KBTC issue confirmation. KBTC balance and delta
might be incorrect [2022-06-16T05:13:45Z INFO issuer] Waiting for 1 confirmations on bitcoin bitcoin
network [2022-06-16T05:19:05Z INFO issuer] Received 1/1 confirmations [2022-06-16T05:19:05Z INFO
issuer] Wrapped balance: 0 KBTC sat [2022-06-16T05:19:05Z INFO issuer] Native balance:
135061149220 KINT planck [2022-06-16T05:19:05Z INFO issuer] BTC balance: 17673 BTC sat [2022-06-
16T05:19:05Z INFO issuer] Delta wrapped balance: 0 KBTC sat [2022-06-16T05:19:05Z INFO issuer]
Delta native balance: -167517990 KINT planck [2022-06-16T05:19:05Z INFO issuer] Delta BTC balance:
-14582 BTC sat [2022-06-16T05:19:05Z INFO issuer] Waiting 15 seconds before next loop iteration
[2022-06-16T05:19:20Z INFO issuer] [7]----- [2022-06-16T05:19:20Z INFO
issuer] Sufficient BTC balance to attempt issues [2022-06-16T05:19:20Z INFO issuer] Max BTC issue
amount for this iteration: 12673 [2022-06-16T05:19:24Z INFO issuer] Selected vault
a3dJfVzssBJgBmRuMZBre5H71rvawHJoFvFHGz2Aq7Hdt492w with issuable amount of 9662 KBTC
[2022-06-16T05:20:18Z INFO issuer] Sending issue request for 9662 BTC sat to parachain [2022-06-
16T05:20:18Z INFO issuer] Issue request accepted [2022-06-16T05:20:18Z INFO issuer] Issue BTC
address: bc1qdxtc8gd976jmy7qu2d5ng4klyu8rdn38fgms8 [2022-06-16T05:20:18Z INFO issuer] Issue
amount: 9648 KBTC sat [2022-06-16T05:20:18Z INFO issuer] Issue fee: 14 KBTC sat [2022-06-
16T05:20:18Z INFO issuer] Building BTC transaction [2022-06-16T05:20:18Z INFO issuer] Transaction
sent. TxID: afdd16253dde00883ae4132912fd1822017aab1a1c83da026444bee31699ec70 [2022-06-
16T05:20:18Z INFO issuer] Not waiting for parachain KBTC issue confirmation. KBTC balance and delta
might be incorrect [2022-06-16T05:20:18Z INFO issuer] Waiting for 1 confirmations on bitcoin bitcoin
network [2022-06-16T05:25:17Z INFO issuer] Received 1/1 confirmations [2022-06-16T05:25:17Z INFO
issuer] Wrapped balance: 0 KBTC sat [2022-06-16T05:25:17Z INFO issuer] Native balance:
134901828453 KINT planck [2022-06-16T05:25:17Z INFO issuer] BTC balance: 5771 BTC sat [2022-06-
16T05:25:17Z INFO issuer] Delta wrapped balance: 0 KBTC sat [2022-06-16T05:25:17Z INFO issuer]
Delta native balance: -159320767 KINT planck [2022-06-16T05:25:17Z INFO issuer] Delta BTC balance:
-11902 BTC sat [2022-06-16T05:25:17Z INFO issuer] Waiting 15 seconds before next loop iteration
[2022-06-16T05:25:33Z INFO issuer] [8]----- [2022-06-16T05:25:33Z WARN
issuer] Insufficient BTC balance: 5771 BTC sat [2022-06-16T05:25:33Z INFO issuer] Waiting 200 seconds
before checking again [2022-06-16T05:29:07Z INFO issuer] [9]----- [2022-06-
16T05:29:07Z WARN issuer] Insufficient BTC balance: 5771 BTC sat [2022-06-16T05:29:07Z INFO issuer]
Waiting 200 seconds before checking again [2022-06-16T05:32:40Z INFO issuer] [10]-----
-----

```

Running the Redeemer:

```
./target/release/redeemer --btc-address <BTC_ADDRESS>
```

Command options and flags:

-v, --verbose

Returns a verbose log

--treat-all-vaults-as-premium

This option is provided in order to test the Redeemer in a situation where no Premium Redeem vault exists. It will consider each vault as Premium Redeem.

--sleeptime-main-loop <SLEEPTIME_MAIN_LOOP>

--sleeptime-no-premium-vault <SLEEPTIME_NO_PREMIUM_VAULT> >

--sleeptime-not-enough-balance <SLEEPTIME_NOT_ENOUGH_BALANCE>

By default the Issuer will pause 15 seconds after every loop and after determining that its KBTC balance is insufficient or that no eligible vault is available. The above options allow the user to fine tune these idle times

--min-wrapped-balance <MIN_WRAPPED_BALANCE>

The minimum required KBTC wallet balance in sat for the Redeemer to request a redeem [default: 2000]

--max-redeem-amount <MAX_REDEEM_AMOUNT> The maximum amount in satoshis allowed for an individual redeem request generated by the Redeemer. The issue request will be max between this value and the greater available vault issuable capacity [default: 3000]

--min-issue-amount <MIN_ISSUE_AMOUNT> The minimum amount in satoshis allowed for the Issuer to generate an issue request, must be greater than Bridge Fee + BTC Network Fee + BTC Dust Limit [default: 2000]

-- keyfile

-- keyname

The Redeemer and Issuer will read the Kintsugi account information from a json file. Unless specified in a commandline option, the Redeemer looks for this a file named keyfile.json in the current durectory. In each file the entry with the correct keyname is read. By default the keyname is "keyname". You can override these defaults with a commandline option.

keyfile.json

This file should contain the Kintsugi account of the BOT. You should follow the same syntax as the keyfile for vault accounts[^3].

Example executions of the Redeemer

The below output is run with the default settings, with the bitcoin RPC url, user and password specified. As there are no Premium Redeem vaults available in the Testnet at the moment of the example, it will loop without redeeming. The example is run on the Interlay Testnet as mentionned in the log.

```
~/int/my-interbtc-clients-cli | premium-bot-1.12.0 !6
./target/testnet/release/redeemer \
  --bitcoin-rpc-url http://localhost:18332 \
  --bitcoin-rpc-user premium \
  --bitcoin-rpc-pass botbotbot
[2022-06-11T16:12:15Z INFO redeemer] Connected to Interlay Testnet parachain
[2022-06-11T16:12:15Z INFO redeemer] -----
[2022-06-11T16:12:16Z INFO redeemer] Connected to bitcoin Testnet network
```

```

[2022-06-11T16:12:16Z INFO redeemer] -----
[2022-06-11T16:12:16Z INFO redeemer] Parachain signer:
5GTH76cE3vQyehe5w2Q9si4nxZ1izyvQzB6WezCSJGTKxwCU
[2022-06-11T16:12:16Z INFO redeemer] 1 BTC confirmations required
[2022-06-11T16:12:16Z INFO redeemer] Max redeem amount:          15000 KBTC sat
[2022-06-11T16:12:16Z INFO redeemer] Min wrapped balance:        5000 KBTC sat
[2022-06-11T16:12:16Z INFO redeemer] Initial wrapped balance:    7130503 KBTC sat
[2022-06-11T16:12:16Z INFO redeemer] Initial collateral balance: 43095926098 KSM
planck
[2022-06-11T16:12:16Z INFO redeemer] Initial native balance:      337685378527
KINT planck
[2022-06-11T16:12:16Z INFO redeemer] Initial BTC balance:        104969 BTC sat
[2022-06-11T16:12:16Z INFO redeemer] [1]-----
[2022-06-11T16:12:16Z INFO redeemer] Max KBTC redeem amount for this iteration:
15000
[2022-06-11T16:12:16Z INFO redeemer] Sufficient KBTC balance to attempt premium
redeems
[2022-06-11T16:12:16Z WARN redeemer] No premium redeem vault found
[2022-06-11T16:12:16Z INFO redeemer] Waiting 60 seconds before checking again
[2022-06-11T16:13:17Z INFO redeemer] [2]-----
[2022-06-11T16:13:17Z INFO redeemer] Max KBTC redeem amount for this iteration:
15000
[2022-06-11T16:13:17Z INFO redeemer] Sufficient KBTC balance to attempt premium
redeems
[2022-06-11T16:13:17Z WARN redeemer] No premium redeem vault found
[2022-06-11T16:13:17Z INFO redeemer] Waiting 60 seconds before checking again

```

To observe the Redeemer actually sending redeem requests, we have added the option "--treat-all-vaults-as-premium". Here you can see that 4 redeems are performed on 4 different vaults (as all available issuable KBTC are treated as premium for testing purposes). After the 4th redeem, the issuable capacity is too low and the Redeemer does idle loops until later on another vault has enough capacity.

```

~/int/my-interbtc-clients-cli | premium-bot-1.12.0 !6
./target/testnet/release/redeemer \
--bitcoin-rpc-url http://localhost:18332 \
--bitcoin-rpc-user premium \
--bitcoin-rpc-pass botbotbot \
--treat-all-vaults-as-premium
[2022-06-11T15:57:53Z INFO redeemer] Connected to Interlay Testnet parachain
[2022-06-11T15:57:53Z INFO redeemer] -----
[2022-06-11T15:57:53Z INFO redeemer] Connected to bitcoin Testnet network
[2022-06-11T15:57:53Z INFO redeemer] -----
[2022-06-11T15:57:53Z INFO redeemer] Parachain signer:
5GTH76cE3vQyehe5w2Q9si4nxZ1izyvQzB6WezCSJGTKxwCU
[2022-06-11T15:57:53Z INFO redeemer] 1 BTC confirmations required
[2022-06-11T15:57:53Z INFO redeemer] Treat all vaults as premium (for testing)
[2022-06-11T15:57:53Z INFO redeemer] Max redeem amount:          15000 KBTC sat
[2022-06-11T15:57:53Z INFO redeemer] Min wrapped balance:        5000 KBTC sat
[2022-06-11T15:57:53Z INFO redeemer] Initial wrapped balance:    7166548 KBTC sat
[2022-06-11T15:57:53Z INFO redeemer] Initial collateral balance: 43095926098 KSM
planck

```

```

[2022-06-11T15:57:53Z INFO redeemer] Initial native balance:      340115536759
KINT planck
[2022-06-11T15:57:53Z INFO redeemer] Initial BTC balance:        74636 BTC sat
[2022-06-11T15:57:53Z INFO redeemer] [1]-----
[2022-06-11T15:57:53Z INFO redeemer] Max KBTC redeem amount for this iteration:
15000
[2022-06-11T15:57:53Z INFO redeemer] Sufficient KBTC balance to attempt premium
redeems
[2022-06-11T15:57:54Z INFO redeemer] Found vault
5HfxGxXggqxTa8xpTnrYrwwd7XUVk3RLUZUWNedLfJ8jw2WP with capacity 10028
[2022-06-11T15:57:54Z INFO redeemer] Redeem request amount  10028 KBTC Sat
[2022-06-11T15:57:54Z INFO redeemer] BTC receive address:
tb1qd6n59ldzjrecdzkyme5e2dda0jpye9kpl57cnu
[2022-06-11T15:57:54Z INFO redeemer] Sending redeem request to parachain to vault
5HfxGxXggqxTa8xpTnrYrwwd7XUVk3RLUZUWNedLfJ8jw2WP
[2022-06-11T15:59:03Z INFO redeemer] Parachain confirms redeem request of 10028
KBTC sat to BTC address tb1qd6n59ldzjrecdzkyme5e2dda0jpye9kpl57cnu
[2022-06-11T15:59:04Z INFO redeemer] Wrapped balance:          7156520 KBTC sat
[2022-06-11T15:59:04Z INFO redeemer] Collateral balance:       43095926098 KSM
planck
[2022-06-11T15:59:04Z INFO redeemer] Native balance:          339625251748 KINT
planck
[2022-06-11T15:59:04Z INFO redeemer] BTC balance:              74636 BTC sat
[2022-06-11T15:59:04Z INFO redeemer] Delta wrapped balance:   -10028 KBTC sat
[2022-06-11T15:59:04Z INFO redeemer] Delta collateral balance: 0 KSM planck
[2022-06-11T15:59:04Z INFO redeemer] Delta native balance:    -490285011 KINT
planck
[2022-06-11T15:59:04Z INFO redeemer] Delta BTC balance:       0 BTC sat
[2022-06-11T15:59:04Z INFO redeemer] Waiting 10 seconds before next loop
iteration
[2022-06-11T15:59:14Z INFO redeemer] [2]-----
[2022-06-11T15:59:14Z INFO redeemer] Max KBTC redeem amount for this iteration:
15000
[2022-06-11T15:59:14Z INFO redeemer] Sufficient KBTC balance to attempt premium
redeems
[2022-06-11T15:59:14Z INFO redeemer] Found vault
5CScYivFvmE8jTD3EfU8Z2zPciar1JXSj6bvE7Umnrs43zyj with capacity 10010
[2022-06-11T15:59:14Z INFO redeemer] Redeem request amount  10010 KBTC Sat
[2022-06-11T15:59:14Z INFO redeemer] BTC receive address:
tb1qzmqhadrfd6gj8nvxvk3xqlq5v6v7qast83rj1wh
[2022-06-11T15:59:14Z INFO redeemer] Sending redeem request to parachain to vault
5CScYivFvmE8jTD3EfU8Z2zPciar1JXSj6bvE7Umnrs43zyj
[2022-06-11T15:59:59Z INFO redeemer] Parachain confirms redeem request of 10010
KBTC sat to BTC address tb1qzmqhadrfd6gj8nvxvk3xqlq5v6v7qast83rj1wh
[2022-06-11T16:00:00Z INFO redeemer] Wrapped balance:          7146510 KBTC sat
[2022-06-11T16:00:00Z INFO redeemer] Collateral balance:       43095926098 KSM
planck
[2022-06-11T16:00:00Z INFO redeemer] Native balance:          339134977523 KINT
planck
[2022-06-11T16:00:00Z INFO redeemer] BTC balance:              74636 BTC sat
[2022-06-11T16:00:00Z INFO redeemer] Delta wrapped balance:   -10010 KBTC sat
[2022-06-11T16:00:00Z INFO redeemer] Delta collateral balance: 0 KSM planck
[2022-06-11T16:00:00Z INFO redeemer] Delta native balance:    -490274225 KINT
planck

```

```
[2022-06-11T16:00:00Z INFO redeemer] Delta BTC balance:          0 BTC sat
[2022-06-11T16:00:00Z INFO redeemer] Waiting 10 seconds before next loop
iteration
[2022-06-11T16:00:10Z INFO redeemer] [3]-----
[2022-06-11T16:00:10Z INFO redeemer] Max KBTC redeem amount for this iteration:
15000
[2022-06-11T16:00:10Z INFO redeemer] Sufficient KBTC balance to attempt premium
redeems
[2022-06-11T16:00:10Z INFO redeemer] Found vault
5H6MkGXDz3f1BYQx3DcfjBs3i4cHixAKzh221aXd7V45ojeN with capacity 9008
[2022-06-11T16:00:10Z INFO redeemer] Redeem request amount  9008 KBTC Sat
[2022-06-11T16:00:10Z INFO redeemer] BTC receive address:
tb1q6vnjv9wwgtapgsh3jp2swlr3wa6png7uv4la5v
[2022-06-11T16:00:10Z INFO redeemer] Sending redeem request to parachain to vault
5H6MkGXDz3f1BYQx3DcfjBs3i4cHixAKzh221aXd7V45ojeN
[2022-06-11T16:00:55Z INFO redeemer] Parachain confirms redeem request of 9008
KBTC sat to BTC address tb1q6vnjv9wwgtapgsh3jp2swlr3wa6png7uv4la5v
[2022-06-11T16:00:56Z INFO redeemer] Wrapped balance:          7137502 KBTC sat
[2022-06-11T16:00:56Z INFO redeemer] Collateral balance:       43095926098 KSM
planck
[2022-06-11T16:00:56Z INFO redeemer] Native balance:          338644714083 KINT
planck
[2022-06-11T16:00:56Z INFO redeemer] BTC balance:             74636 BTC sat
[2022-06-11T16:00:56Z INFO redeemer] Delta wrapped balance:   -9008 KBTC sat
[2022-06-11T16:00:56Z INFO redeemer] Delta collateral balance: 0 KSM planck
[2022-06-11T16:00:56Z INFO redeemer] Delta native balance:    -490263440 KINT
planck
[2022-06-11T16:00:56Z INFO redeemer] Delta BTC balance:       0 BTC sat
[2022-06-11T16:00:56Z INFO redeemer] Waiting 10 seconds before next loop
iteration
[2022-06-11T16:01:06Z INFO redeemer] [4]-----
[2022-06-11T16:01:06Z INFO redeemer] Max KBTC redeem amount for this iteration:
15000
[2022-06-11T16:01:06Z INFO redeemer] Sufficient KBTC balance to attempt premium
redeems
[2022-06-11T16:01:06Z INFO redeemer] Found vault
5F7Q9FqnGwJmjLtsFGymHZXPEx2dWRVE7NW4Sw2jzEhUB5WQ with capacity 6956
[2022-06-11T16:01:06Z INFO redeemer] Redeem request amount  6956 KBTC Sat
[2022-06-11T16:01:07Z INFO redeemer] BTC receive address:
tb1qwnl6e8c9mg7c3kdqgwx5y444s92453gx5cyh6x
[2022-06-11T16:01:07Z INFO redeemer] Sending redeem request to parachain to vault
5F7Q9FqnGwJmjLtsFGymHZXPEx2dWRVE7NW4Sw2jzEhUB5WQ
[2022-06-11T16:01:44Z INFO redeemer] Parachain confirms redeem request of 6956
KBTC sat to BTC address tb1qwnl6e8c9mg7c3kdqgwx5y444s92453gx5cyh6x
[2022-06-11T16:01:44Z INFO redeemer] Wrapped balance:          7130546 KBTC sat
[2022-06-11T16:01:44Z INFO redeemer] Collateral balance:       43095926098 KSM
planck
[2022-06-11T16:01:44Z INFO redeemer] Native balance:          338154461427 KINT
planck
[2022-06-11T16:01:44Z INFO redeemer] BTC balance:             74636 BTC sat
[2022-06-11T16:01:44Z INFO redeemer] Delta wrapped balance:   -6956 KBTC sat
[2022-06-11T16:01:44Z INFO redeemer] Delta collateral balance: 0 KSM planck
[2022-06-11T16:01:44Z INFO redeemer] Delta native balance:    -490252656 KINT
planck
```



```
[2022-06-11T16:01:44Z INFO redeemer] Delta BTC balance:          0 BTC sat
[2022-06-11T16:01:44Z INFO redeemer] Waiting 10 seconds before next loop
iteration
[2022-06-11T16:01:54Z INFO redeemer] [5]-----
[2022-06-11T16:01:54Z INFO redeemer] Max KBTC redeem amount for this iteration:
15000
[2022-06-11T16:01:54Z INFO redeemer] Sufficient KBTC balance to attempt premium
redeems
[2022-06-11T16:01:55Z INFO redeemer] Found vault
5H6MkGXDz3f1BYQx3DcfjBs3i4cHixAKzh221aXd7V45ojeN with capacity 125
[2022-06-11T16:01:55Z INFO redeemer] Redeem request amount 125 KBTC Sat is below
dust level
[2022-06-11T16:01:55Z INFO redeemer] Waiting 60 seconds before checking again
[2022-06-11T16:02:55Z INFO redeemer] [6]-----
...
[2022-06-11T16:03:56Z INFO redeemer] [7]-----
...
[2022-06-11T16:04:57Z INFO redeemer] [8]-----
...
[2022-06-11T16:05:58Z INFO redeemer] [9]-----
[2022-06-11T16:05:58Z INFO redeemer] Max KBTC redeem amount for this iteration:
15000
[2022-06-11T16:05:58Z INFO redeemer] Sufficient KBTC balance to attempt premium
redeems
[2022-06-11T16:05:59Z INFO redeemer] Found vault
5F7Q9FqnGwJmjLtsFGymHZXPEx2dWRVE7NW4Sw2jzEhUB5WQ with capacity 5035
[2022-06-11T16:05:59Z INFO redeemer] Redeem request amount 5035 KBTC Sat
[2022-06-11T16:05:59Z INFO redeemer] BTC receive address:
tb1qapnephwpkrmmcnauy2rqhtx5r96qt7ma3j3k4y
[2022-06-11T16:05:59Z INFO redeemer] Sending redeem request to parachain to vault
5F7Q9FqnGwJmjLtsFGymHZXPEx2dWRVE7NW4Sw2jzEhUB5WQ
[2022-06-11T16:06:33Z INFO redeemer] Parachain confirms redeem request of 5035
KBTC sat to BTC address tb1qapnephwpkrmmcnauy2rqhtx5r96qt7ma3j3k4y
[2022-06-11T16:06:33Z INFO redeemer] Wrapped balance:          7130503 KBTC sat
[2022-06-11T16:06:33Z INFO redeemer] Collateral balance:        43095926098 KSM
planck
[2022-06-11T16:06:33Z INFO redeemer] Native balance:           337685378527 KINT
planck
[2022-06-11T16:06:33Z INFO redeemer] BTC balance:              74636 BTC sat
[2022-06-11T16:06:33Z INFO redeemer] Delta wrapped balance:    -5035 KBTC sat
[2022-06-11T16:06:33Z INFO redeemer] Delta collateral balance: 0 KSM planck
[2022-06-11T16:06:33Z INFO redeemer] Delta native balance:    -469082900 KINT
planck
[2022-06-11T16:06:33Z INFO redeemer] Delta BTC balance:        0 BTC sat
[2022-06-11T16:06:33Z INFO redeemer] Waiting 10 seconds before next loop
iteration
[2022-06-11T16:06:44Z INFO redeemer] [10]-----
[2022-06-11T16:06:44Z INFO redeemer] Max KBTC redeem amount for this iteration:
15000
[2022-06-11T16:06:44Z INFO redeemer] Sufficient KBTC balance to attempt premium
redeems
[2022-06-11T16:06:44Z INFO redeemer] Found vault
5H6MkGXDz3f1BYQx3DcfjBs3i4cHixAKzh221aXd7V45ojeN with capacity 125
[2022-06-11T16:06:44Z INFO redeemer] Redeem request amount 125 KBTC Sat is below
```

```
dust level
[2022-06-11T16:06:44Z INFO redeemer] Waiting 60 seconds before checking again
```

Example executions of the Redeemer on the Kintsugi network

Below we execute the Redeemer on the Kintsugi network. No Premium Vaults are available

```
./target/kintsugi/release/redeemer
--bitcoin-rpc-url http://localhost:8332
--bitcoin-rpc-user premium
--bitcoin-rpc-pass botbotbot
--max-redeem-amount 100000
--sleep-time-not-enough-balance 200
--keyfile ../kintsugi_bot_test/keyfile.json [2022-06-16T04:50:36Z INFO redeemer] Connected to Kintsugi
parachain [2022-06-16T04:50:36Z INFO redeemer] ----- [2022-06-16T04:50:40Z
INFO redeemer] Connected to bitcoin Bitcoin network [2022-06-16T04:50:40Z INFO redeemer] -----
----- [2022-06-16T04:50:40Z INFO redeemer] Parachain signer:
5DkmTr3NeLPkQqefuU7QMjHJsoso8vbDQbiTEFjCae2ecpK [2022-06-16T04:50:40Z INFO redeemer] 1
BTC confirmations required [2022-06-16T04:50:40Z INFO redeemer] Max redeem amount: 100000 KBTC
sat [2022-06-16T04:50:40Z INFO redeemer] Min wrapped balance: 5000 KBTC sat [2022-06-
16T04:50:40Z INFO redeemer] Initial wrapped balance: 40908 KBTC sat [2022-06-16T04:50:40Z INFO
redeemer] Initial collateral balance: 0 KSM planck [2022-06-16T04:50:40Z INFO redeemer] Initial native
balance: 135359201482 KINT planck [2022-06-16T04:50:40Z INFO redeemer] Initial BTC balance: 0 BTC
sat [2022-06-16T04:50:40Z INFO redeemer] [1]----- [2022-06-16T04:50:40Z
INFO redeemer] Max KBTC redeem amount for this iteration: 40908 [2022-06-16T04:50:40Z INFO
redeemer] Sufficient KBTC balance to attempt premium redeems [2022-06-16T04:50:40Z WARN
redeemer] No premium redeem vault found [2022-06-16T04:50:40Z INFO redeemer] Waiting 60
seconds before checking again [2022-06-16T04:51:41Z INFO redeemer] [2]-----
[2022-06-16T04:51:41Z INFO redeemer] Max KBTC redeem amount for this iteration: 40908
```

We then test the "treat all vaults as premium" option to confirm that redeems work

```
./target/kintsugi/release/redeemer
--bitcoin-rpc-url http://localhost:8332
--bitcoin-rpc-user premium
--bitcoin-rpc-pass botbotbot
--max-redeem-amount 100000
--sleep-time-not-enough-balance 200
--keyfile ../kintsugi_bot_test/keyfile.json
--treat-all-vaults-as-premium [2022-06-16T04:52:16Z INFO redeemer] Connected to Kintsugi parachain
[2022-06-16T04:52:16Z INFO redeemer] ----- [2022-06-16T04:52:17Z INFO
redeemer] Connected to bitcoin Bitcoin network [2022-06-16T04:52:17Z INFO redeemer] -----
----- [2022-06-16T04:52:17Z INFO redeemer] Parachain signer:
5DkmTr3NeLPkQqefuU7QMjHJsoso8vbDQbiTEFjCae2ecpK [2022-06-16T04:52:17Z INFO redeemer] 1
BTC confirmations required [2022-06-16T04:52:17Z INFO redeemer] Treat all vaults as premium (for
testing) [2022-06-16T04:52:17Z INFO redeemer] Max redeem amount: 100000 KBTC sat [2022-06-
16T04:52:17Z INFO redeemer] Min wrapped balance: 5000 KBTC sat [2022-06-16T04:52:17Z INFO
```



```

redeemer] Initial wrapped balance: 40908 KBTC sat [2022-06-16T04:52:17Z INFO redeemer] Initial
collateral balance: 0 KSM planck [2022-06-16T04:52:17Z INFO redeemer] Initial native balance:
135359201482 KINT planck [2022-06-16T04:52:17Z INFO redeemer] Initial BTC balance: 0 BTC sat
[2022-06-16T04:52:17Z INFO redeemer] [1]----- [2022-06-16T04:52:17Z INFO
redeemer] Max KBTC redeem amount for this iteration: 40908 [2022-06-16T04:52:17Z INFO redeemer]
Sufficient KBTC balance to attempt premium redeems [2022-06-16T04:52:18Z INFO redeemer] Found
vault a3fudELrRCjuSyYEPkRAKFQyjo5YyU228LdqinGsnjBUNB8P with capacity 15373639 [2022-06-
16T04:52:18Z INFO redeemer] Redeem request amount 40908 KBTC Sat [2022-06-16T04:52:18Z INFO
redeemer] BTC receive address: bc1q7wnj7avg39psd2svn2tmqzt7f058tsq2ttgcyf [2022-06-16T04:52:18Z
INFO redeemer] Sending redeem request to parachain to vault
5HmB7sj7CZK1YWdSWGT64DqR4zKo4utEq4uQAnCFaGovRx6S [2022-06-16T04:53:10Z INFO redeemer]
Parachain confirms redeem request of 40908 KBTC sat to BTC address
bc1q7wnj7avg39psd2svn2tmqzt7f058tsq2ttgcyf [2022-06-16T04:53:10Z INFO redeemer] Wrapped
balance: 0 KBTC sat [2022-06-16T04:53:10Z INFO redeemer] Collateral balance: 0 KSM planck [2022-06-
16T04:53:10Z INFO redeemer] Native balance: 135228667210 KINT planck [2022-06-16T04:53:10Z INFO
redeemer] BTC balance: 0 BTC sat [2022-06-16T04:53:10Z INFO redeemer] Delta wrapped balance:
-40908 KBTC sat [2022-06-16T04:53:10Z INFO redeemer] Delta collateral balance: 0 KSM planck [2022-
06-16T04:53:10Z INFO redeemer] Delta native balance: -130534272 KINT planck [2022-06-
16T04:53:10Z INFO redeemer] Delta BTC balance: 0 BTC sat [2022-06-16T04:53:10Z INFO redeemer]
Waiting 10 seconds before next loop iteration [2022-06-16T04:53:20Z INFO redeemer] [2]-----
----- [2022-06-16T04:53:20Z INFO redeemer] Max KBTC redeem amount for this iteration: 0
[2022-06-16T04:53:20Z WARN redeemer] KBTC balance (or max redeem amount) lower than minimum
balance of 5000 Sat [2022-06-16T04:53:20Z INFO redeemer] Waiting 200 seconds before checking
again

```

[^1]: We refer here to a Kintsugi Parachain, but the Premium BOT will work similarly in a Testnet or Interlay network. Just replace the Kintsugi, KBTC, KINT, KSM terms accordingly. [^2]: <https://bitcoindevkit.org/> [^3]: See <https://docs.interlay.io/#/vault/installation?id=prerequisites> [^4]: The extended master private key mentioned here is the actual key used on BTC Testnet to test the BOT during development. You can reuse it to confirm the BOT runs correctly.