GDSC 2022

2022

How to be good engineer ?

face wallet HAECHI AUDIT Henesis HAECHI TRADING

HAECHI

Agenda

01

1. 자기소개
2. 문제풀이, 대회가 해커가 되기 위해 어떤 도움이 될까
3. 연구? 리서치? 어디서 정보를 얻을 수 있을까
4. 좋은 분석가가 되기 위한 몇 가지 이야기
5. 여담

HAECHI

Self Introductions

02

자기소개

HAECHI

Self Introductions

Haechi Labs

- **Email : jeremy@haechi.io**
- **Age : 25**
- **aka : skwid**
- **Role**
  - Blockchain security researcher
  - Malware analyst
  - Reverse Engineer

Self Introductions

Reverse Engineer in SG
- CodeGate
- HITCON
- SECCON
- DEFCON Finalist (But COVID-19..)
- LINE CTF
- etc..

Career
- 0-Day, 1-Day Researcher (2016 ~ 2020)
- Developer (LLVM & AI, 2020 ~ 2022)
- Blockchain security engineer (2022 ~)

CTF? Wargame?

03

문제풀이, 대회가 해커가 되기 위해 어떤 도움이 될까

CTF? Wargame?

CTF ?

- **https://ctftime.org/**
- **Can find real-time ctf from ctftime**
- **Well known : Defcon (US), Seccon (JP) ..**
- **Last weekend : Hack.lu 2022**
- **Now : N1CTF 2022**
  - I have to participate after end of this conference

CTF? Wargame?

Study Materials for Researchers

maybe, we can get flag with some revision

rkm0959 2022.09.25.

i'll let skwid finish this

you have to deploy bytecode in the create2'ed contract

you can do this with assembly

```
bytes memory bytecode = hex"6080...."
assembly {
  addr := create(0, add(bytecode, 0x20), mload(bytecode)
}
```

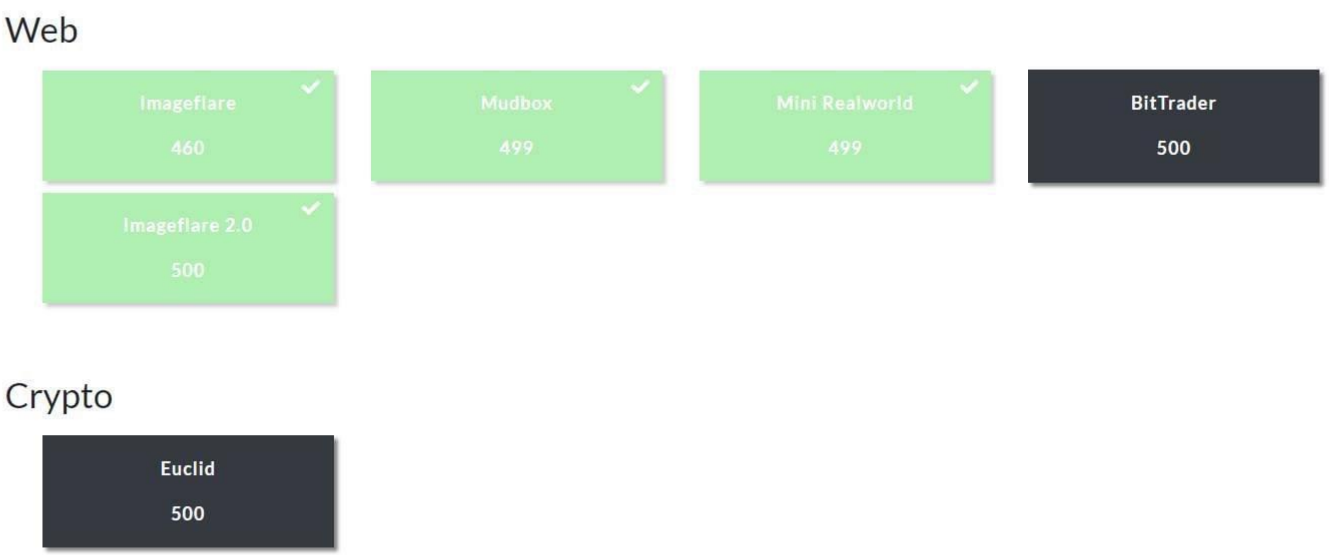
skwid 2022.09.25.

```
```import { ethers } from "hardhat";
import { Contract, ContractFactory, Signer } from "ethers";
import { text } from "stream/consumers";

let Factory : ContractFactory;
let FactoryAssembly : ContractFactory;
```
```

CTF? Wargame?

Study Materials for Researchers



CTF? Wargame?

CTF is useful for keeping up with trends
- Hardware, IoT Security ..
- Browser Security ..
- Blockchain Security ..
- etc ..

For Example ...
- Paradigm CTF ?
- ...

CTF? Wargame?

Example : Blockchain challenge from CTF

- https://eips.ethereum.org/EIPS/eip-1014

EIP-1014: Skinny CREATE2 ‹›

Author	Vitalik Buterin
Status	Final
Type	Standards Track
Category	Core
Created	2018-04-20

Table of Contents

Specification

Adds a new opcode (`CREATE2`) at `0xf5` , which takes 4 stack arguments: endowment, memory_start, memory_length, salt. Behaves identically to `CREATE` (`0xf0`), except using `keccak256( 0xff ++ address ++ salt ++ keccak256(init_code))[12:]` instead of the usual sender-and-nonce-hash as the address where the contract is initialized at.

The `CREATE2` has the same `gas` schema as `CREATE` , but also an extra `hashcost` of `GSHA3WORD * ceil(len(init_code) / 32)` , to account for the hashing that must be performed. The `hashcost` is deducted at the same time as memory-expansion gas and `CreateGas` is deducted: *before* evaluation of the resulting address and the execution of `init_code` .

- `0xff` is a single byte,
- `address` is always `20` bytes,
- `salt` is always `32` bytes (a stack item).

The preimage for the final hashing round is thus always exactly `85` bytes long.

The coredev-call at 2018-09-10 decided to use the formula above

CTF? Wargame?

CREATE2 can create the same contract address

- But, how to abuse this specification?
- CTFs and Wargames give us learning opportunities

EIP-1014: Skinny CREATE2 ‹›

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The coredev-call at 2018-08-10 decided to use the formula above

Information for research

04

연구? 리서치? 어디서 정보를 얻을 수 있을까

HAECHI

Information for research

How can we get information before we start researching

Twitter is the best place to follow up on the latest security incidents, attack techniques, tech blogs, and more

A blog organized by a famous team of hackers makes it easy to get advanced technical issues

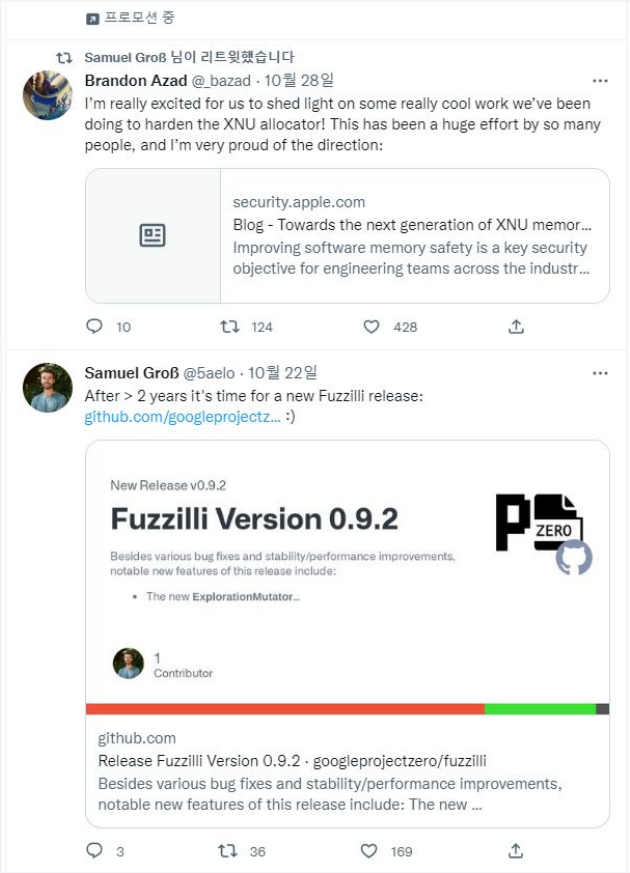
We can keep track of what's newly added components or services through GitHub commit logs

In addition, information can be obtained through various blogs, for example, the 360 Security Blog

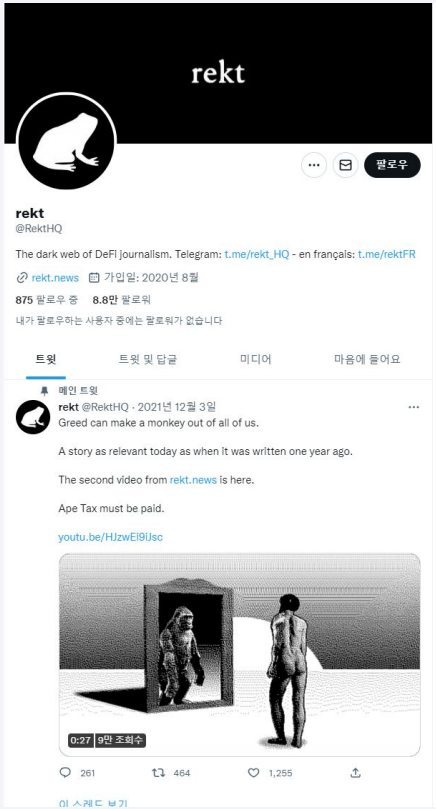
Twitter ?

Many hackers uses Twitter platform

- **They even record their research progress and achievements on Twitter.**
- **There are many hackers, each with their own special skills (like saelo)**
- **Feedback on the latest research trends is really fast.**



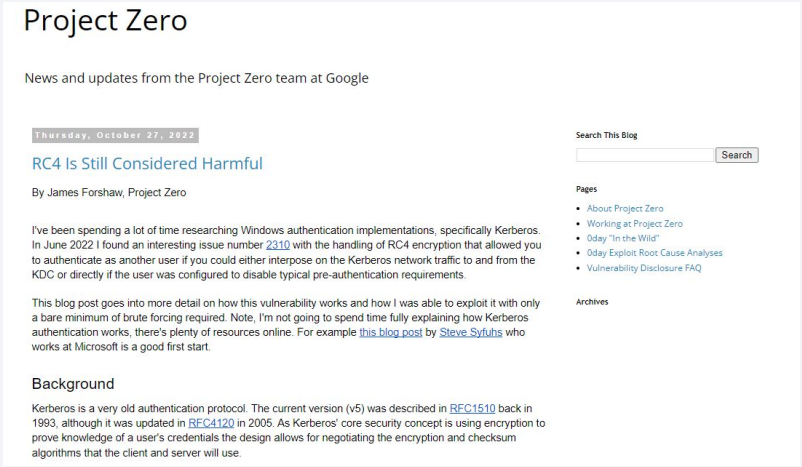
Twitter ?

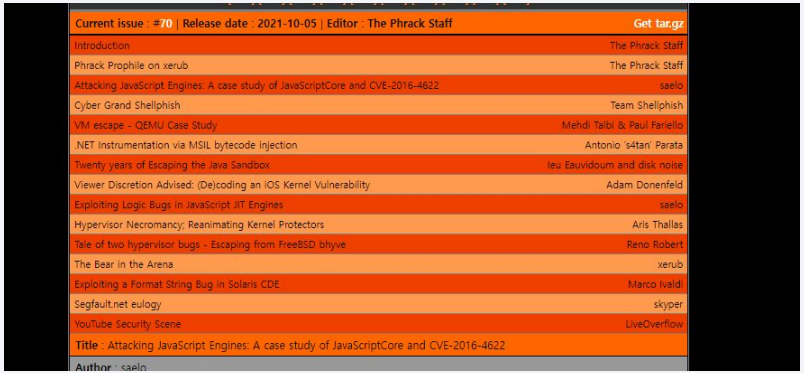


Blogs ?

Famous research teams have their own blogs

- **ProjectZero blogspot**
- **360 security blog ..**
- **An ‘individual’, not a ‘team’, also has a blog**
  - like saelo’s phrack blog
- **ProjectZero monorail**
  - Not sure if this should also be classified as a blog





Blogs ?

What is SCM_RIGHTS?

Linux developers can share file descriptors (fd) from one process to another using the SCM_RIGHTS datagram with the sendmsg syscall. When a process passes a file descriptor to another process, `SCM_RIGHTS` will add a reference to the underlying `file` struct. This means that the process that is sending the file descriptors can immediately close the file descriptor on their end, even if the receiving process has not yet accepted and taken ownership of the file descriptors. When the file descriptors are in the "queued" state (meaning the sender has passed the fd and then closed it, but the receiver has not yet accepted the fd and taken ownership), specialized garbage collection is needed. To track this "queued" state, this LWN article does a great job explaining `SCM_RIGHTS` reference counting, and it's recommended reading before continuing on with this blogpost.

Sending

As stated previously, a unix domain socket uses the syscall `sendmsg` to send a file descriptor to another socket. To explain the reference counting that occurs during `SCM_RIGHTS`, we'll start from the sender's point of view. We start with the kernel function `unix_stream_sendmsg`, which implements the `sendmsg` syscall. To implement the `SCM_RIGHTS` functionality, the kernel uses the structure `scm_fp_list` for managing all the transmitted `file` structures. `scm_fp_list` stores the list of `file` pointers to be passed.

```
struct scm_fp_list {
        short                   count;
        short                   max;
        struct user_struct      *user;
        struct file             *fp[SCM_MAX_FD];
};
```

`unix_stream_sendmsg` invokes `scm_send` (af_unix.c#L1886) to initialize the `scm_fp_list` structure, linked by the `scm_cookie` structure on the stack.

happened: A vulnerability post... (Dec)

- Windows Exploitation Tricks: Relaying DCOM Authent... (Oct)
- Using Kerberos for Authentication Relay Attacks (Oct)
- How a simple Linux kernel memory corruption bug ca... (Oct)
- Fuzzing Closed-Source JavaScript Engines with Cove... (Sep)
- Understanding Network Access in Windows AppContainers (Aug)
- An EPYC escape: Case-study of a KVM breakout (Jun)
- Fuzzing iOS code on macOS at native speed (May)
- Designing sockfuzzer, a network syscall fuzzer for... (Apr)
- Policy and Disclosure: 2021 Edition (Apr)
- Who Contains the Containers? (Apr)
- In-the-Wild Series: October 2020 0-day discovery (Mar)
- Déjà vu-lnerability (Feb)
- A Look at iMessage in iOS 14 (Jan)
- Windows Exploitation Tricks:

Blogs ?

2308	Fixed	----	2022-May-28	Microsoft	Windows	forshaw	Windows: Credential Guard TGT Renewal Information Disclosure CCProjectZeroMembers
2307	Fixed	----	2022-May-27	Microsoft	Windows	forshaw	Windows: Credential Guard Non-Constant Time Comparison Information Disclosure CCProjectZeroMembers
2306	Fixed	----	2022-May-27	Microsoft	Windows	forshaw	Windows: Credential Guard KerbIumGetNtlmSupplementalCredential Information Disclosure CCProjectZeroMembers
2305	Fixed	----	2022-May-27	Microsoft	Windows	forshaw	Windows: Credential Guard KerbIumCreateApReqAuthenticator Key Information Disclosure CCProjectZeroMembers
2304	Fixed	----	2022-May-27	Microsoft	Windows	forshaw	Windows: Credential Guard Kerberos Change Password EoP CCProjectZeroMembers
2303	Fixed	----	2022-May-27	Microsoft	Windows	forshaw	Windows: Credential Guard Insufficient Checks on Kerberos Encryption Type Use CCProjectZeroMembers
2302	Fixed	----	2022-May-27	Microsoft	Windows	forshaw	Windows: Credential Guard BCrypt Context Use-After-Free EoP CCProjectZeroMembers
2301	Fixed	----	2022-May-27	Microsoft	Windows	forshaw	Windows: Credential Guard ASN1 Decoder Type Confusion EoP CCProjectZeroMembers
2300	Fixed	----	2022-May-27	Google	Chrome	glazunov	Chrome: heap-use-after-free in LinkToTextMenuObserver::CompleteWithError CCProjectZeroMembers
2299	Fixed	----	2022-May-20	Microsoft	Kernel	mjurczyk	Windows Kernel multiple memory problems when handling incorrectly formatted security descriptors in registry hives CCProjectZeroMembers
2297	Fixed	----	2022-May-17	Microsoft	Kernel	mjurczyk	Windows Kernel invalid read/write due to unchecked Blink cell index in root security descriptor CCProjectZeroMembers
2296	Fixed	----	2022-May-13	Google	Chrome	markbrand	Chrome: PaintImage deserialization OOB-read CCProjectZeroMembers

Blogs ?

project-zero project-zero ▾ | New issue | All issues ▾ | Search project-zero issues... ▾

☆ Starred by 2 users

Owner: forshaw@google.com

CC: proje...@google.com

Status: Fixed *(Closed)*

Components: ----

Modified: Sep 9, 2022

Finder-forshaw
Deadline-90
Product-Windows
Severity-low
CCProjectZeroMembers
Vendor-Microsoft
Methodology-Manual
Reported-2022-May-27
MSRC-72169
Fixed-2022-Aug-09

Issue 2304: Windows: Credential Guard Kerberos Change Password EoP

Reported by forshaw@google.com on Sat, May 28, 2022, 3:32 AM GMT+9 Project Member

Windows: Credential Guard Kerberos Change Password EoP
Platform: Windows 10+
Class: Elevation of Privilege
Security Boundary: Virtual Secure Mode

Summary: Credential guard doesn't prevent using encrypted Kerberos keys to change a user's password leading to EoP.

Assumptions: The vulnerability described assumes that a user has authenticated to a machine but is currently not active. As in they're not typing in their password which could be captured by a malicious SSP

I also assume that you have SYSTEM and/or PPL bypass (assuming such a thing exists) or as you shouldn't be able attack Credential G

However, this research isn't going to verify t LSASS process memory so it'd only be a ma

Description: When a user authenticates to a

Expected Result:
The creation of a password change ticket fails.

Observed Result:
The password change ticket is created and the user's password can be changed.

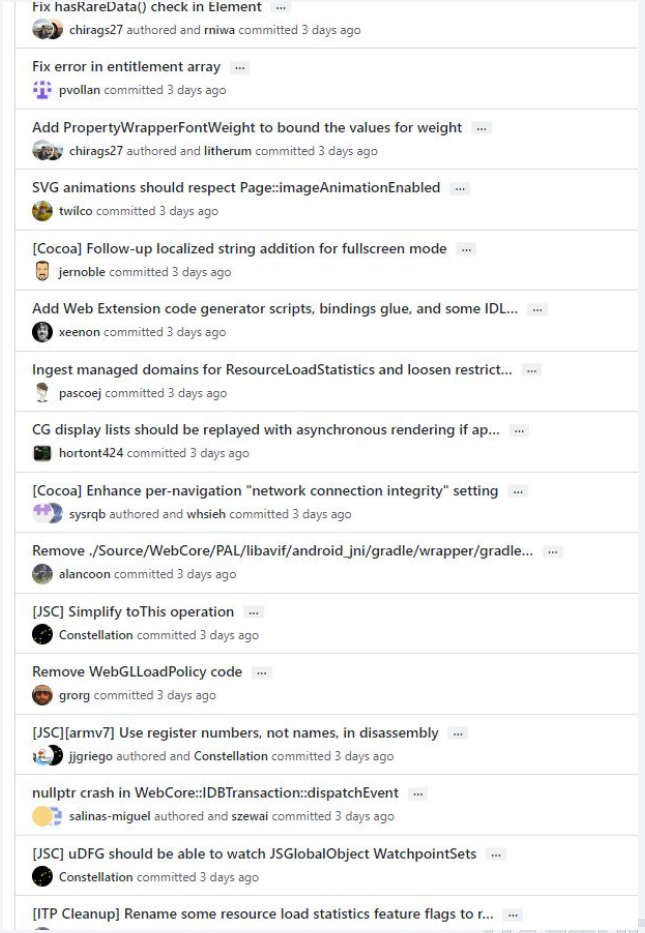
This bug is subject to a 90-day disclosure deadline. If a fix for this issue is made available to users before the end of the 90-day deadline, this bug report will become public 30 days after the fix was made available. Otherwise, this bug report will become public at the deadline.
The scheduled deadline is 2022-08-25.

poc_kpass.zip
11.3 KB Download

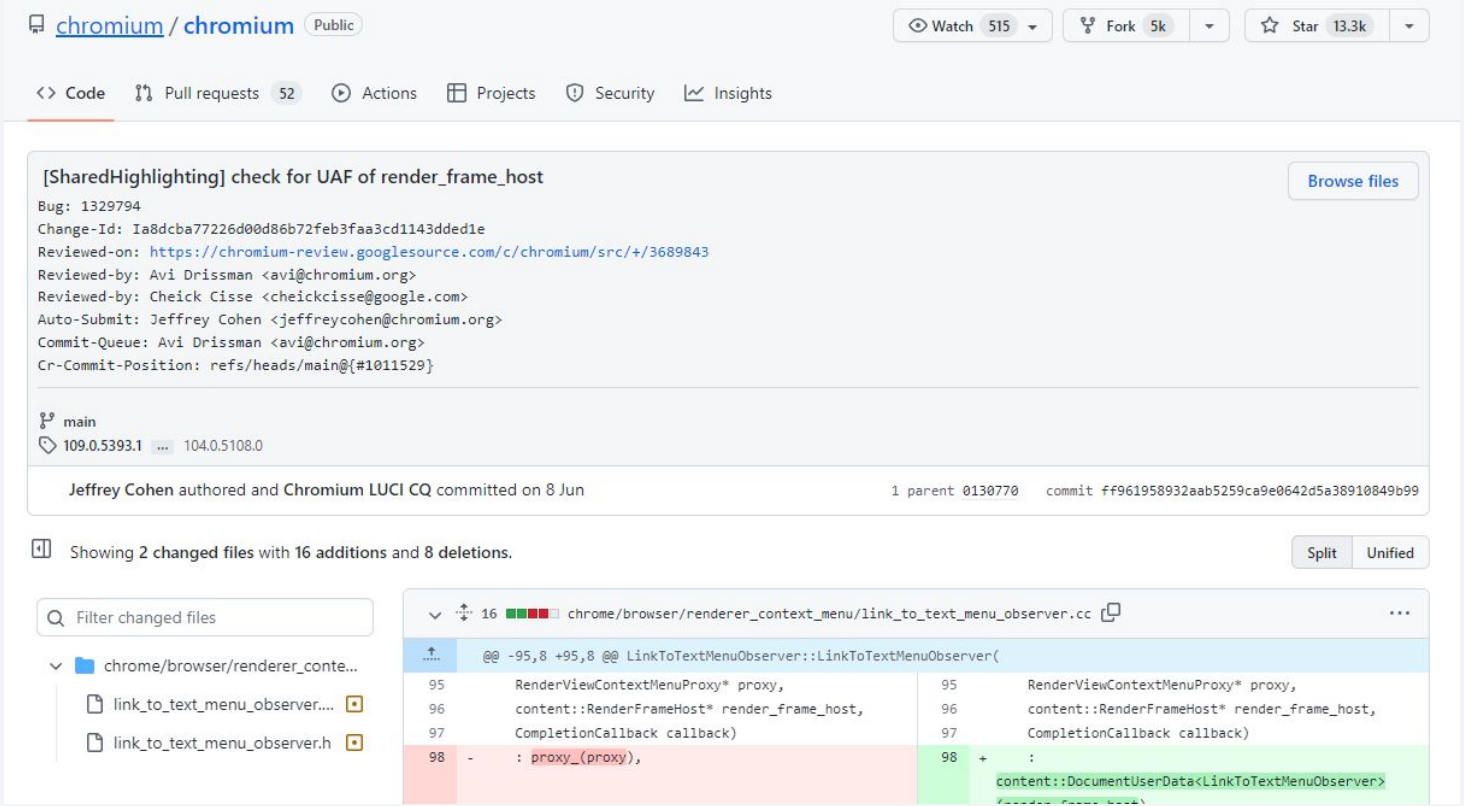
Github ?

As the developers here already know

- you can find out about the features that are currently under development through the commit log on GitHub.
- and sometimes, we can find vulnerability report from hacker through the commit log



GitHub ?



Some tips for analyst

06

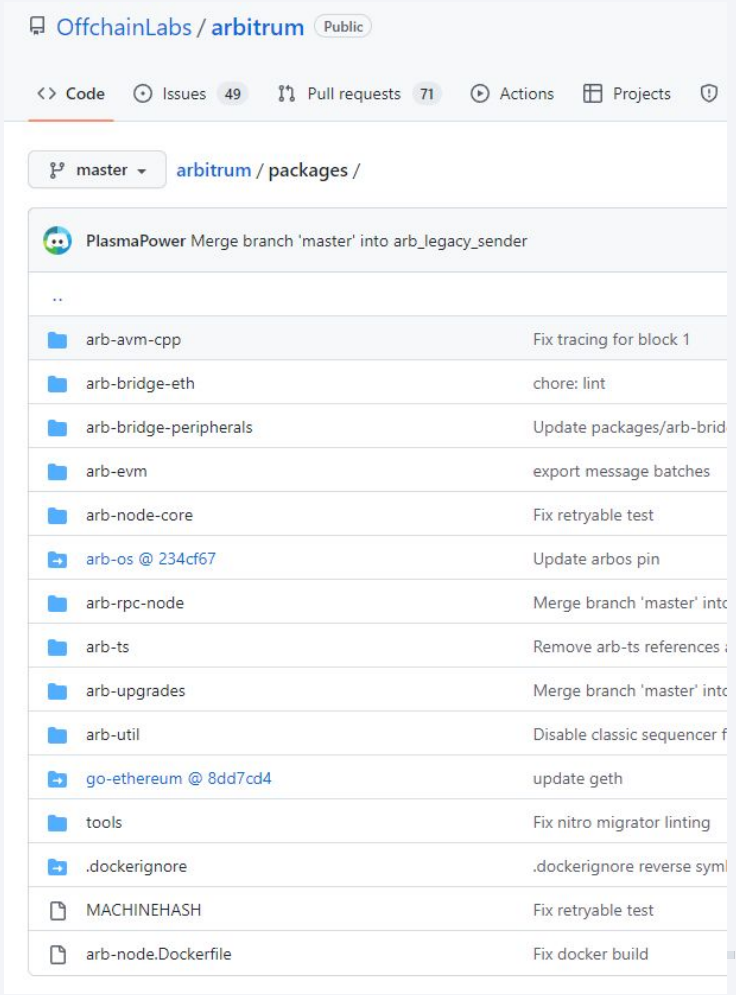
좋은 분석가가 되기 위한 몇 가지 이야기

HAECHI

Difficulty

Which part of code should i analyze ?

- **General source code is too huge**
  - Like chromium, arbitrum ..
- **We need to choose component to be analyzed**
- **Sufficient information needs to be gathered before analysis**
  - Like Whitepaper, class references ..
- **How to reduce repetitive tasks**

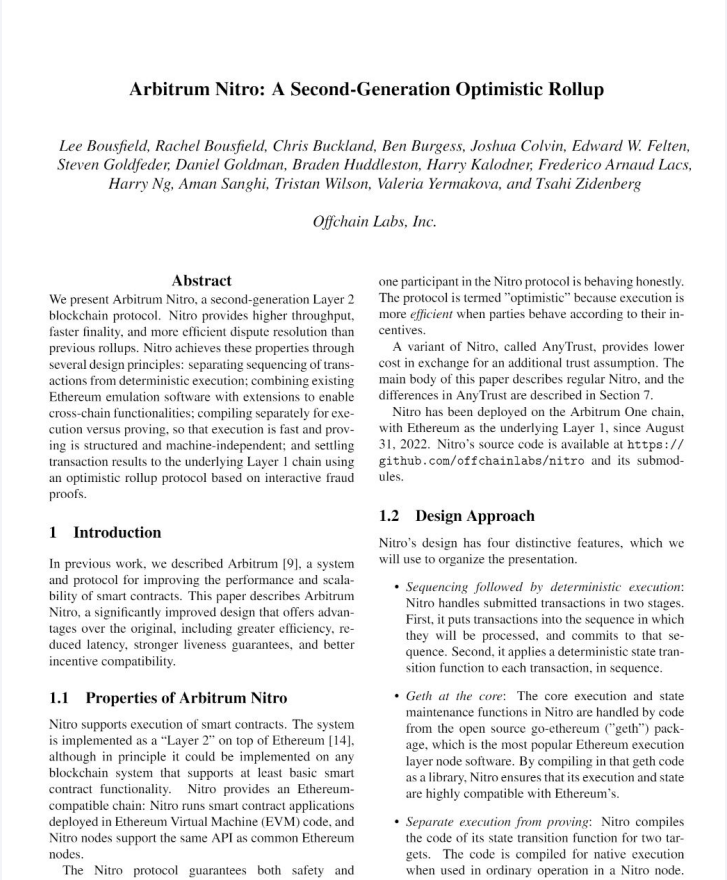


Whitepaper ?

Whitepaper helps you get rid of code you don’t need to analyze

Whitepaper helps you to draw an image of architecture in your brain

Whitepaper helps to understand the components and concepts that the software implements



Arbitrum Nitro: A Second-Generation Optimistic Rollup

Lee Bousfield, Rachel Bousfield, Chris Buckland, Ben Burgess, Joshua Colvin, Edward W. Felten, Steven Goldfeder, Daniel Goldman, Braden Huddleston, Harry Kalodner, Frederico Arnaud Lacs, Harry Ng, Aman Sanghi, Tristan Wilson, Valeria Yermakova, and Tsahi Zidenberg

Offchain Labs, Inc.

Abstract

We present Arbitrum Nitro, a second-generation Layer 2 blockchain protocol. Nitro provides higher throughput, faster finality, and more efficient dispute resolution than previous rollups. Nitro achieves these properties through several design principles: separating sequencing of transactions from deterministic execution; combining existing Ethereum emulation software with extensions to enable cross-chain functionalities; compiling separately for execution versus proving, so that execution is fast and proving is structured and machine-independent; and settling transaction results to the underlying Layer 1 chain using an optimistic rollup protocol based on interactive fraud proofs.

1 Introduction

In previous work, we described Arbitrum [9], a system and protocol for improving the performance and scalability of smart contracts. This paper describes Arbitrum Nitro, a significantly improved design that offers advantages over the original, including greater efficiency, reduced latency, stronger liveness guarantees, and better incentive compatibility.

1.1 Properties of Arbitrum Nitro

Nitro supports execution of smart contracts. The system is implemented as a “Layer 2” on top of Ethereum [14], although in principle it could be implemented on any blockchain system that supports at least basic smart contract functionality. Nitro provides an Ethereum-compatible chain: Nitro runs smart contract applications deployed in Ethereum Virtual Machine (EVM) code, and Nitro nodes support the same API as common Ethereum nodes.

The Nitro protocol guarantees both safety and one participant in the Nitro protocol is behaving honestly. The protocol is termed ”optimistic” because execution is more *efficient* when parties behave according to their incentives.

A variant of Nitro, called AnyTrust, provides lower cost in exchange for an additional trust assumption. The main body of this paper describes regular Nitro, and the differences in AnyTrust are described in Section 7.

Nitro has been deployed on the Arbitrum One chain, with Ethereum as the underlying Layer 1, since August 31, 2022. Nitro’s source code is available at `https://github.com/offchainlabs/nitro` and its submodules.

1.2 Design Approach

Nitro’s design has four distinctive features, which we will use to organize the presentation.

- *Sequencing followed by deterministic execution*: Nitro handles submitted transactions in two stages. First, it puts transactions into the sequence in which they will be processed, and commits to that sequence. Second, it applies a deterministic state transition function to each transaction, in sequence.
- *Geth at the core*: The core execution and state maintenance functions in Nitro are handled by code from the open source go-ethereum (”geth”) package, which is the most popular Ethereum execution layer node software. By compiling in that geth code as a library, Nitro ensures that its execution and state are highly compatible with Ethereum’s.
- *Separate execution from proving*: Nitro compiles the code of its state transition function for two targets. The code is compiled for native execution when used in ordinary operation in a Nitro node.

Whitepaper ?

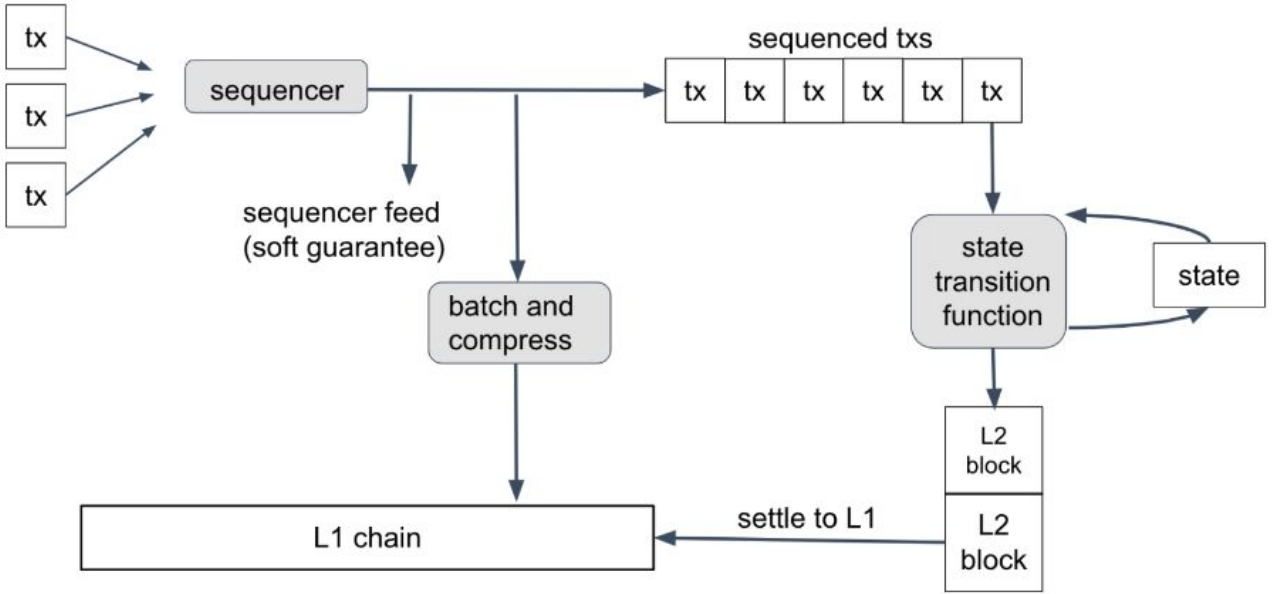


Figure 1: Processing of transactions in Nitro. The sequencer establishes an ordering on transactions, and publishes the order as a real-time feed and as compressed data batches on the L1 chain. Sequenced transactions are processed one at a time by a deterministic state transition function, which updates the chain state and produces L2 blocks. These blocks are later settled to the L1 chain.

Whitepaper ?

1 chain will cause an included message to disappear or change. The current Sequencer implementation includes Delayed Inbox messages after ten minutes. If the Sequencer fails to include a Delayed Inbox message within a fixed interval[4], any party can call the Inbox to force inclusion of the message, which occurs by forcing a Sequencer batch including the message(s) into the Inbox. The ability to submit a message to the Delayed Inbox and force its inclusion without relying on the Sequencer supports Nitro's guarantee of liveness.

3.2.4 Retryable Tickets

Layer 1 contracts can submit transactions to a Nitro chain, but those transactions necessarily run asynchronously on the Nitro chain, so the submitting Layer 1 transaction cannot see whether they succeed. This poses problems for applications such as token bridging which

[4]Setting this parameter reflects a tradeoff between the desire for prompt inclusion, and the desire to avoid unexpected behavior if the Sequencer experiences downtime. Currently it is set to 24 hours, but we expect the value to be reduced as the perceived risk of Sequencer downtime diminishes.

submitters know exactly what the fee will be.

3.2.5 Token Bridge

Nitro's cross-chain messaging affordances can be used to create a Token Bridge, an application that allows for the effective transfer of assets between the Ethereum and Nitro chains. The Offchain Labs team has implemented and released a Token Bridge informally referred to as "canonical", though the Nitro core protocol grants it no special recognition or affordances; it is effectively an application like any other. (Note that, similarly, Nitro has no natively recognized notion of tokens nor of any particular token standard, much like Ethereum.)

At its core, the Token Bridge offers the ability to deposit (transfer from Ethereum to Nitro) and withdraw (transfer from Nitro to Ethereum) fungible tokens. To deposit n tokens, a transaction is sent to Ethereum which carries out two operations: it sends n tokens to an L1 contract (known as a Token Gateway), and creates a retryable transaction (Section 3.2.4) that mints n tokens of an L2-counterpart contract. The two token contracts are counterparts, due to the guarantee that a holder of

Whitepaper ?

```
func (rs *RetryableState) CreateRetryable(
        id common.Hash, // we assume that the id is unique and hasn't been used before
        timeout uint64,
        from common.Address,
        to *common.Address,
        callvalue *big.Int,
        beneficiary common.Address,
        calldata []byte,
) (*Retryable, error) {
        sto := rs.retryables.OpenSubStorage(id.Bytes())
        ret := &Retryable{
                id,
                sto,
                sto.OpenStorageBackedUint64(numTriesOffset),
                sto.OpenStorageBackedAddress(fromOffset),
                sto.OpenStorageBackedAddressOrNil(toOffset),
                sto.OpenStorageBackedBigUint(callvalueOffset),
                sto.OpenStorageBackedAddress(beneficiaryOffset),
                sto.OpenStorageBackedBytes(calldataKey),
                sto.OpenStorageBackedUint64(timeoutOffset),
                sto.OpenStorageBackedUint64(timeoutWindowsLeftOffset),
        }
        _ = ret.numTries.Set(0)
        _ = ret.from.Set(from)
```

Whitepaper ?

```
    _ = ret.numTries.Set(0)
    _ = ret.from.Set(from)
    _ = ret.to.Set(to)
    _ = ret.callvalue.Set(callvalue)
    _ = ret.beneficiary.Set(beneficiary)
    _ = ret.calldata.Set(calldata)
    _ = ret.timeout.Set(timeout)
    _ = ret.timeoutWindowsLeft.Set(0)

    // insert the new retryable into the queue so it can be reaped later
    return ret, rs.TimeoutQueue.Put(id)
}
```

Whitepaper ?

```
func initializeRetryables(statedb *state.StateDB, rs *retryables.RetryableState, initData statetransfer.RetryableDataReader, currentTimestamp uint64) error {
    var retryablesList []*statetransfer.InitializationDataForRetryable
    for initData.More() {
        r, err := initData.GetNext()
        if err != nil {
            return err
        }
        if r.Timeout <= currentTimestamp {
            statedb.AddBalance(r.Beneficiary, r.Callvalue)
            continue
        }
        retryablesList = append(retryablesList, r)
    }
    sort.Slice(retryablesList, func(i, j int) bool {
        a := retryablesList[i]
        b := retryablesList[j]
        if a.Timeout == b.Timeout {
            return arbmath.BigLessThan(a.Id.Big(), b.Id.Big())
        }
        return a.Timeout < b.Timeout
    })
    for _, r := range retryablesList {
        var to *common.Address
        if r.To != (common.Address{}) {
            to = &r.To
        }
        statedb.AddBalance(retryables.RetryableEscrowAddress(r.Id), r.Callvalue)
        _, err := rs.CreateRetryable(r.Id, r.Timeout, r.From, to, r.Callvalue, r.Beneficiary, r.Calldata)
        if err != nil {
            return err
        }
    }
    return initData.Close()
}
```

Whitepaper ?

```
52  func InitializeArbosInDatabase(db ethdb.Database, initData statetransfer.InitDataReader, chainConfig *params.ChainConfig
53      stateDatabase := state.NewDatabase(db)
54      statedb, err := state.New(common.Hash{}, stateDatabase, nil)
55      if err != nil {
56          log.Crit("failed to init empty statedb", "error", err)
57      }
58
59      commit := func() (common.Hash, error) {
60          root, err := statedb.Commit(true)
61          if err != nil {
62              return common.Hash{}, err
63          }
64          err = stateDatabase.TrieDB().Commit(root, true, nil)
65          if err != nil {
66              return common.Hash{}, err
67          }
68          statedb, err = state.New(root, stateDatabase, nil)
69          if err != nil {
70              return common.Hash{}, err
71          }
72          return root, nil
73      }
74
75      burner := burn.NewSystemBurner(nil, false)
76      arbosState, err := InitializeArbosState(statedb, burner, chainConfig)
77      if err != nil {
78          log.Crit("failed to open the ArbOS state", "error", err)
79      }
```

Class/Structure ref

1. How to control the value of a particular memory or variable
2. Which class dependencies should be considered
3. What class is class A related to

Class/Structure ref

1. Reviewing class references reduces the scope of the code you have to look at

2. You can check which variables and class instances are derived from which functions or classes

3. It makes you to check in advance the factors to be considered when writing the exploit code

Make scenario

1. It is efficient to organize the types of vulnerabilities that can occur in a specific situation in perform analysis.

2. For example, in a bridge application of a blockchain, duplicated withdrawal problem or an address calculation problem may occur.

3. Whether it’s useful to come up with a scenario can vary from person to person.

Make scenario

1. Many user can stake tokens into staking smart contract.
2. If end of this staking period, users receive regular rewards against the funds they have deposited
3. User’s reward request will be appended into pending request queue
4. Admin can accept pending requests from queue when he want

Make scenario

5. Denial of Service

including **gas limit reached**, **unexpected throw**, **unexpected kill**, **access control breached**

I accidentally killed it.

— devops199 on the Parity multi-sig wallet

Denial of service is deadly in the world of Ethereum: while other types of applications can eventually recover, smart contracts can be taken offline forever by just one of these attacks. Many ways lead to denials of service, including maliciously behaving when being the recipient of a transaction, artificially increasing the gas necessary to compute a function, abusing access controls to access private components of smart contracts, taking advantage of mixups and negligence, etc. This class of attack includes many different variants and will probably see a lot of development in the years to come.

Loss: estimated at 514,874 ETH (~300M USD at the time)

Real World Impact:

Make scenario

```
submissionFee := retryables.RetryableSubmissionFee(len(tx.RetryData), tx.L1BaseFee)
if arbmath.BigLessThan(tx.MaxSubmissionFee, submissionFee) {
    // should be impossible as this is checked at L1
    err := fmt.Errorf(
        "max submission fee %v is less than the actual submission fee %v",
        tx.MaxSubmissionFee, submissionFee,
    )
    return true, 0, err, nil
}

// collect the submission fee
if err := transfer(&tx.From, &networkFeeAccount, submissionFee); err != nil {
    // should be impossible as we just checked that they have enough balance for the max submission fee,
    // and we also checked that the max submission fee is at least the actual submission fee
    glog.Error("failed to transfer submissionFee", "err", err)
    return true, 0, err, nil
}
withheldSubmissionFee := takeFunds(availableRefund, submissionFee)

// refund excess submission fee
submissionFeeRefund := takeFunds(availableRefund, arbmath.BigSub(tx.MaxSubmissionFee, submissionFee))
if err := transfer(&tx.From, &tx.FeeRefundAddr, submissionFeeRefund); err != nil {
    // should never happen as from's balance should be at least availableRefund at this point
    glog.Error("failed to transfer submissionFeeRefund", "err", err)
}
```

Make scenario

1. How to submit retryable transaction with zero submission fee ?
2. Can bridge balance was bypassed with underflow vulnerability ?
3. Is there any problem in calculating the escrow address ?
4. etc...

Make scenario

There are more components to think about some scenarios

- **ArbOS**
- **WAVM**
- **Retryable Ticket**
- **Standard Library Problem ..**
- **Etc..**

Choose best tools

Classic and simple tools are good, but there are many useful tools.

When choosing a tool, choose one that eliminates as much hassle as possible

Tools related to automation are good, but analysis tools with nice interface should also be selected in consideration of the above.

So, which tools are examples of good tools ?

DBI ?

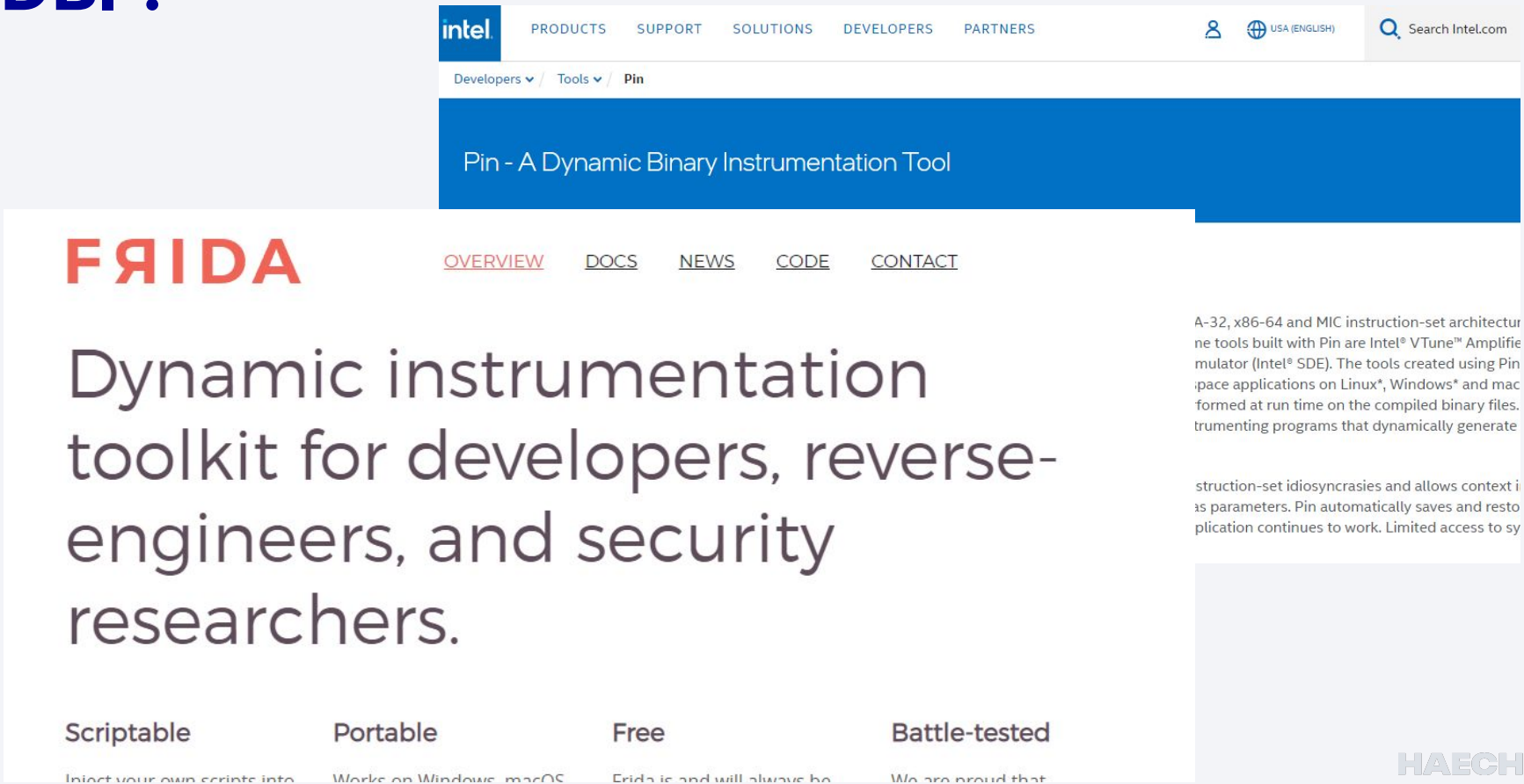
1. For example, PIN and Frida ..

2. DBI provides functions such as tracking the flow of the program you want to analyze, tracking the data movement flow in memory, and hooking.

3. You can do it quickly through DBI programming, without having to manually trace function calls or track movements of input values.

4. This effectively reduces your time consumption.

DBI ?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Free
Battle-tested

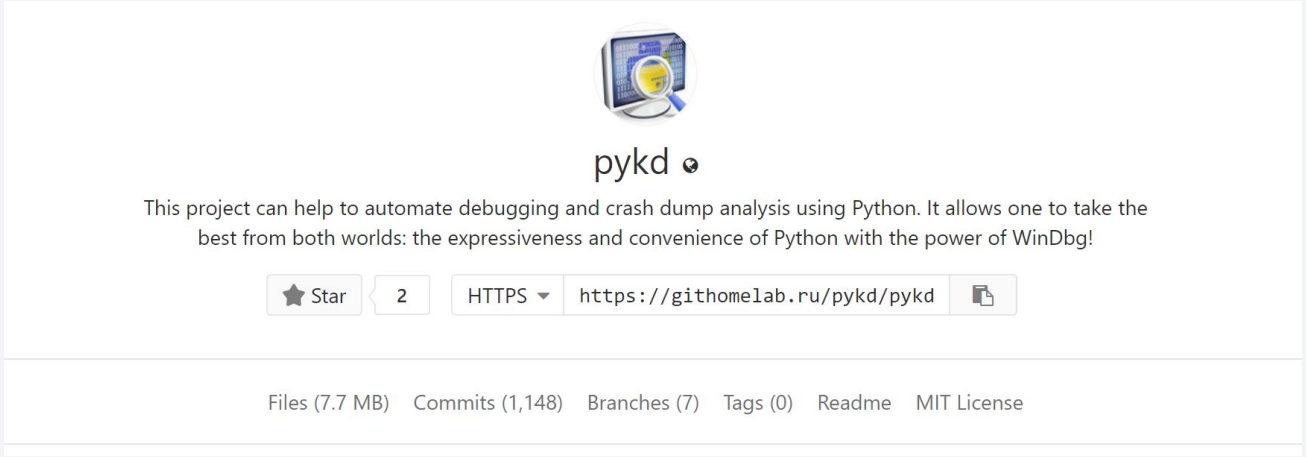
Debugging Scripts

1. For example, immScript, pykd ..

2. Debugging scripts make using the debugger efficient and simplifying hard debugging tasks.

3. In my case, I mainly use pykd when using windbg for operating system and kernel analysis.

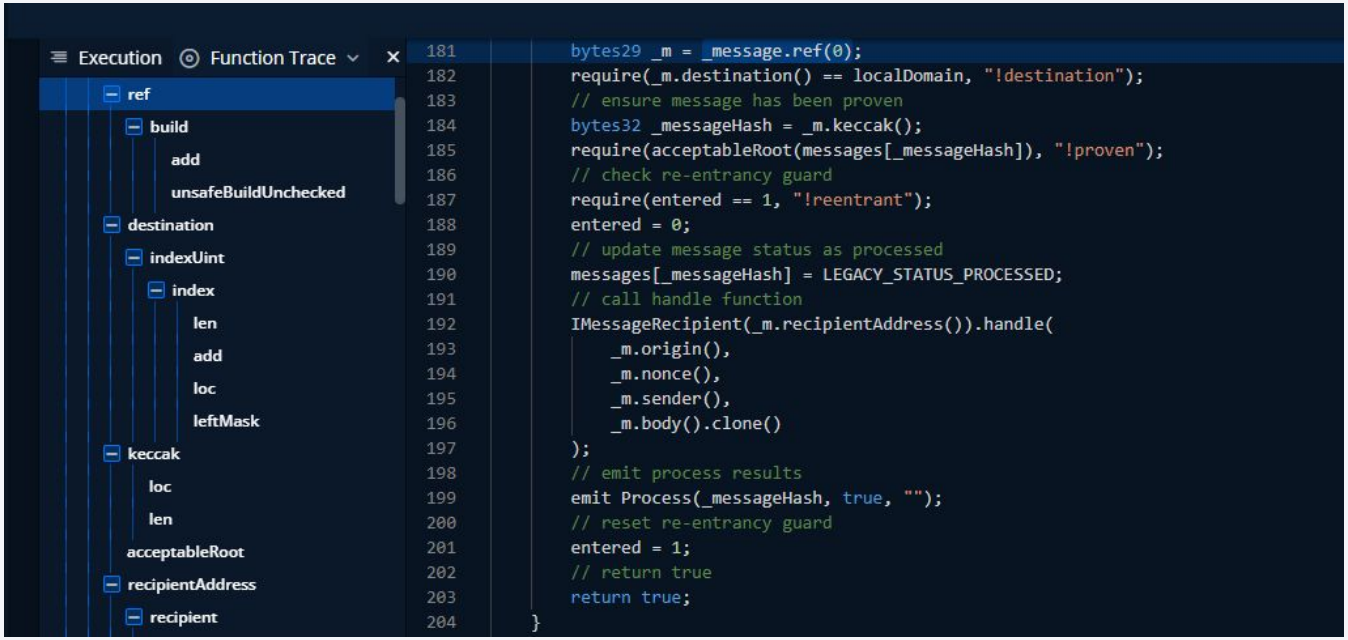
Debugging Scripts



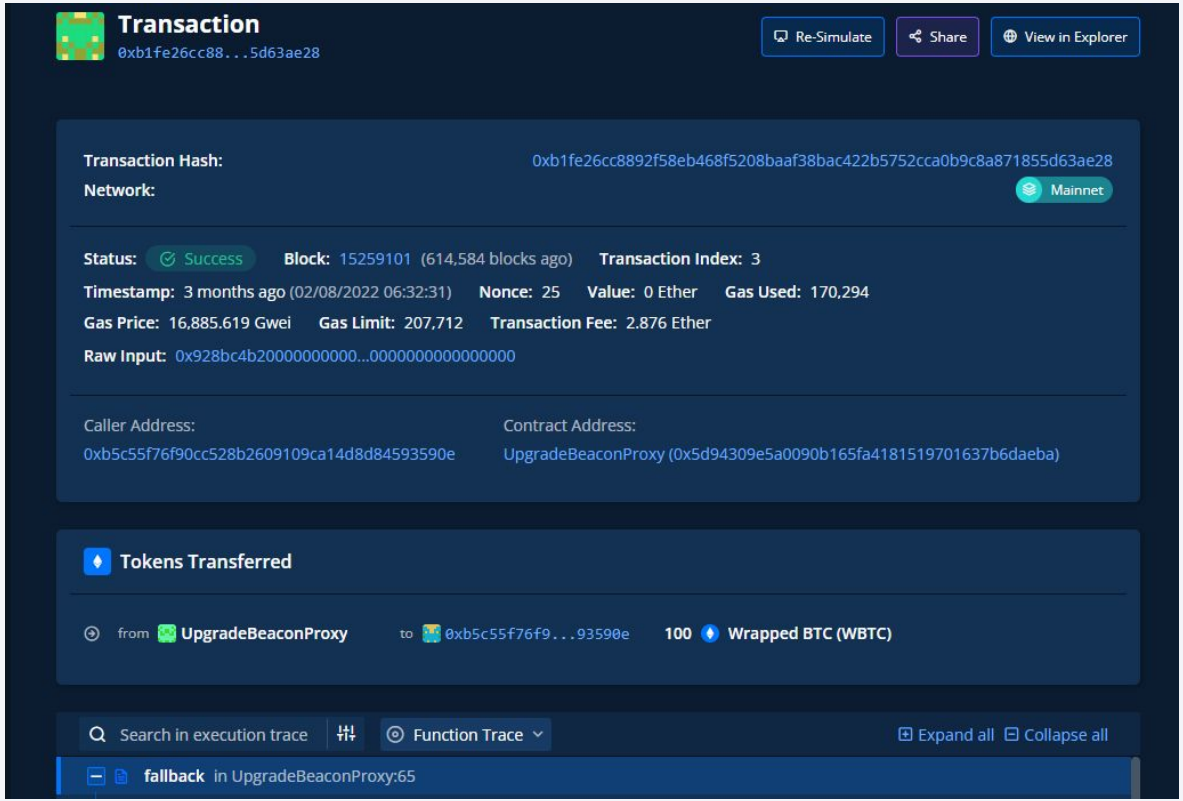
From blockchain ?

1. For example, slither, tenderly ..
2. I’m working on analytics for malicious transactions on blockchain network.
3. For this reason, a tool called tenderly is very helpful to me.
4. Tenderly graphically shows token transferring and transaction execution very efficiently.

From blockchain ?

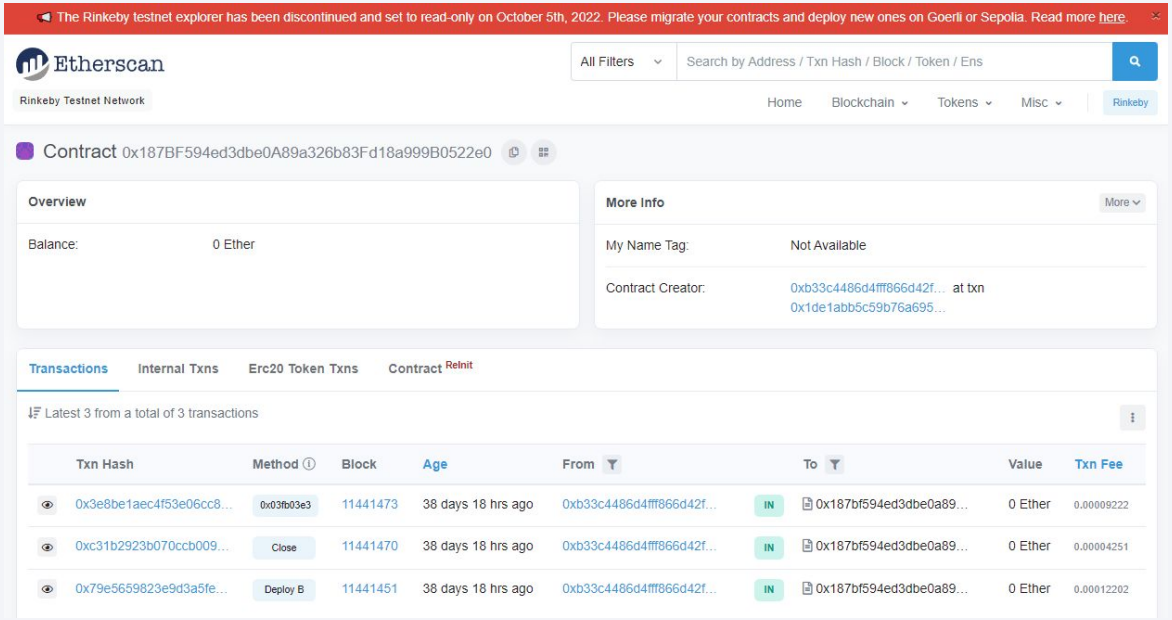


From blockchain ?



Others ...

Scylla, IDAPython ..



For example ..

From zer0pts ctf 2021 reverse engineering challenge

- Super Secret Login
- Which software developed with Autoit3
- It consists of a flow that parses the code on the emulator and executes the bytecodes.

For Example ..

```
.text:00419FC6                  mov     dword_4C0CAC, 1
.text:00419FD0                  mov     dword_4C0CB0, 2
.text:00419FDA                  mov     byte_4C0CB4, 0
.text:00419FE1                  mov     dword_4C0CB8, offset aDllcall ; "DLLCALL"
.text:00419FEB                  mov     dword_4C0CC4, offset sub_47E237
.text:00419FF5                  mov     dword_4C0CC8, 0
.text:00419FFF                  mov     dword_4C0CCC, 0
.text:0041A009                  mov     dword_4C0CD0, 3
.text:0041A013                  mov     dword_4C0CD4, 43h
.text:0041A01D                  mov     byte_4C0CD8, 0
.text:0041A024                  mov     dword_4C0CDC, offset aDllcalladdress ; "DLLCALLADDRESS"
.text:0041A02E                  mov     dword_4C0CE8, offset sub_47E24B
.text:0041A038                  mov     dword_4C0CEC, 0
.text:0041A042                  mov     dword_4C0CF0, 0
.text:0041A04C                  mov     dword_4C0CF4, 2
.text:0041A056                  mov     dword_4C0CF8, 42h
.text:0041A060                  mov     byte_4C0CFC, 0
.text:0041A067                  mov     dword_4C0D00, offset aDllcallbackfre ; "DLLCALLBACKFREE"
```

For Example ..

```
StringLen : 0x482331
GuiCtrlSetState : 0x47064C
GuiCtrlCreateCheckBox : 0x481917
DllStructCreate : 0x47e7e5
GuiCtrlCreateCheckBox: 0x472D2D
DllStructSetData : 0x47eb06
StringLen : 0x482331
DllStructCreate : 0x47e7e5
DllStructSetData
StringLen
DllStructCreate
DllStructGetPtr : 0x47e99b
DllStructGetPtr
DllStructGetPtr
StringLen
DllCall : 0x47e237
 -> CallWindowProcA -> Execute Generated Function (Check the stack)
DllStructGetData : 0x47e893
GuiCtrlSetState
GuiCtrlCreateCheckBox : 0x4819d5
String : 0x473a3b
MsgBox : 0x47564f
GuiGetMsg : 0x47094f
```

For Example ..

```
}
while ( v6 != 256 );
v9 = 0;
v10 = 0;
v11 = 0;
do
{
  ++v9;
  v12 = (unsigned __int8)(v10 + 1);
  v13 = v16[v12];
  v14 = (unsigned __int8)(v13 + v11);
  LOBYTE(v7) = v16[v14];
  v16[v14] = v13;
  v16[v12] = v7;
  v15 = (unsigned __int8)(v7 + v13);
  LOBYTE(v7) = *(_BYTE *)(a3 + v9 - 1);
  v7 ^= (unsigned __int8)v16[v15];
  sub_94();
}
while ( v9 != a4 );
```

Promotion

07

회사 홍보 (대표님한테 부탁받음)

HAECHI

Promotion

We are belong in blockchain security company, and blockchain researchers.

- https://career.haechi.io/
- https://career.haechi.io/audit/security-researcher

- 문의 : **people@haechi.io**
- 오피스 이쁘니까 구경하러 오세요~

Q&A

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