



VRust

Security Assessment

O2Lab VRust Team

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Summary

This report has been prepared for O2Lab VRust Team to discover issues and vulnerabilities in the source code of the O2Lab VRust Team project as well as any contract dependencies that were not part of an officially recognized library. A comprehensive examination has been performed, utilizing Static Analysis and Manual Review techniques. The auditing process pays special attention to the following considerations:

- Testing the smart contracts against both common and uncommon attack vectors.
- Assessing the codebase to ensure compliance with current best practices and industry standards.
- Ensuring contract logic meets the specifications and intentions of the client.
- Cross referencing contract structure and implementation against similar smart contracts produced by industry leaders.
- Thorough line-by-line manual review of the entire codebase by industry experts.

The security assessment resulted in findings that ranged from critical to informational. We recommend addressing these findings to ensure a high level of security standards and industry practices. We suggest recommendations that could better serve the project from the security perspective:

- Enhance general coding practices for better structures of source codes;
- Add enough unit tests to cover the possible use cases;
- Provide more comments per each function for readability, especially contracts that are verified in public;
- Provide more transparency on privileged activities once the protocol is live.

Overview

Project Summary

Project Name	O2Lab VRust Team
Platform	Ethereum
Language	Solana
Crate	bridge
GitHub Location	https://github.com/parasol-aser/vrust
sha256	Unknown

Audit Summary

Delivery Date	18/02/2022
Audit Methodology	Static Analysis
Key Components	

Vulnerability Summary

Vulnerability Level	Total
Critical	18
Major	0
Medium	0
Minor	0
Informational	0
Discussion	0

Findings

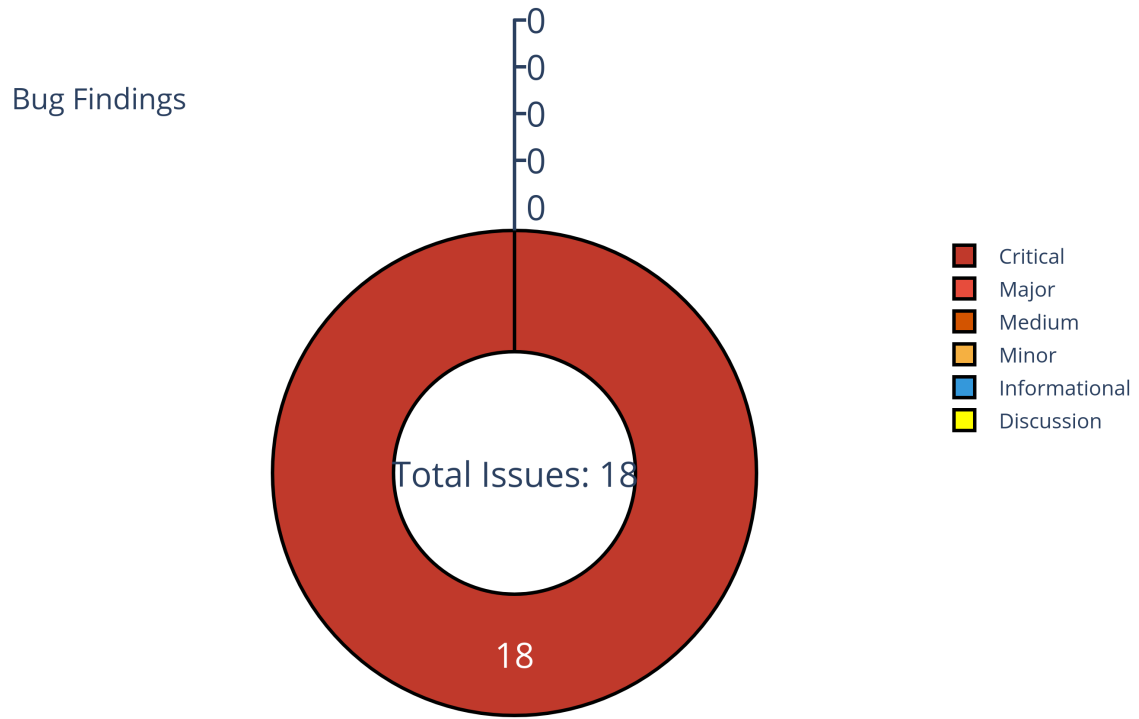


Figure 1: Findings

ID	Title	Category	Severity	Status
TYP_CVE_0	Instruction id not checked error	Instruction id issue	Critical	UnResolved
TYP_CVE_1	Instruction id not checked error	Instruction id issue	Critical	UnResolved
TYP_CVE_2	Instruction id not checked error	Instruction id issue	Critical	UnResolved

ID	Title	Category	Severity	Status
TYP_CVE_3	Instruction id not checked error	Instruction id issue	Critical	UnResolved
TYP_CVE_4	Instruction id not checked error	Instruction id issue	Critical	UnResolved
TYP_CVE_5	Instruction id not checked error	Instruction id issue	Critical	UnResolved
TYP_CVE_6	Instruction id not checked error	Instruction id issue	Critical	UnResolved
TYP_CVE_7	Instruction id not checked error	Instruction id issue	Critical	UnResolved
TYP_CVE_8	Instruction id not checked error	Instruction id issue	Critical	UnResolved
TYP_CVE_9	Instruction id not checked error	Instruction id issue	Critical	UnResolved
TYP_CVE_10	Instruction id not checked error	Instruction id issue	Critical	UnResolved
TYP_CVE_11	Instruction id not checked error	Instruction id issue	Critical	UnResolved
TYP_CVE_12	Instruction id not checked error	Instruction id issue	Critical	UnResolved
TYP_CVE_13	Instruction id not checked error	Instruction id issue	Critical	UnResolved

ID	Title	Category	Severity	Status
TYP_CVE_14	Instruction id not checked error	Instruction id issue	Critical	UnResolved
TYP_CVE_15	Instruction id not checked error	Instruction id issue	Critical	UnResolved
TYP_CVE_16	Instruction id not checked error	Instruction id issue	Critical	UnResolved
TYP_CVE_17	Instruction id not checked error	Instruction id issue	Critical	UnResolved

Issue: TYP_CVE_0: InstructionId - Instruction id not checked error

Category	Severity	Status
Instruction id issue	Critical	UnResolved

• Location

/home/ubuntu/.cargo/registry/src/github.com-1ecc6299db9ec823/solana-program-1.7.0/src/account_info.rs:111:5:
115:6

```

111 pub fn try_borrow_mut_data(&self) -> Result<RefMut<&'a mut [u8]>,
    ↳ ProgramError> {
112     self.data
113         .try_borrow_mut()
114         .map_err(|_| ProgramError::AccountBorrowFailed)
115 }
116

```

• Call Stack

```

1 fn entrypoint() { // /home/ubuntu/.cargo/registry/src/github.com-
    ↳ 1ecc6299db9ec823/solana-program-1.7.0/src/entrypoint.rs:46:9: 53:10
    ↳ }
2 fn instruction::solitaire() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:101:13:
    ↳ 108:14 }
3 fn instruction::dispatch() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:89:
    ↳ 99:14 }
4 fn instruction::Initialize::execute() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:
    ↳ 74:22 }
5 fn api::initialize::initialize() { //
    ↳ program/src/api/initialize.rs:55:1: 98:2 }
6 fn <T as solitaire::Creatable<'a, K>>::create() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/s
    ↳ 150:6 }
7 fn solana_program::program::invoke_signed() { //
    ↳ /home/ubuntu/.cargo/registry/src/github.com-
    ↳ 1ecc6299db9ec823/solana-program-
    ↳ 1.7.0/src/program.rs:15:1: 55:2
    ↳ }

```

```

8      fn
      ↪ solana_program::account_info::AccountInfo::<'a>::try_borrow_mut_data() { //
      ↪ /home/ubuntu/.cargo/registry/src/github.com-
      ↪ 1ecc6299db9ec823/solana-program-1.7.0/src/account_info.rs:111:5:
      ↪ 115:6 }
9

```

- description:

message

- link:

GitHub Link to be added.

- alleviation:

Description of the bug here.

Issue: TYP_CVE_1: InstructionId - Instruction id not checked error

Category	Severity	Status
Instruction id issue	Critical	UnResolved

• Location

/home/ubuntu/.cargo/registry/src/github.com-1ecc6299db9ec823/solana-program-1.7.0/src/account_info.rs:111:5: 115:6

```

111 pub fn try_borrow_mut_data(&self) -> Result<RefMut<&'a mut [u8]>,
    ↳ ProgramError> {
112     self.data
113         .try_borrow_mut()
114         .map_err(|_| ProgramError::AccountBorrowFailed)
115 }
116

```

• Call Stack

```

1 fn entrypoint() { // /home/ubuntu/.cargo/registry/src/github.com-
    ↳ 1ecc6299db9ec823/solana-program-1.7.0/src/entrypoint.rs:46:9: 53:10
    ↳ }
2 fn instruction::solitaire() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:101:13:
    ↳ 108:14 }
3 fn instruction::dispatch() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:89:
    ↳ 99:14 }
4 fn instruction::PostMessage::execute() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:
    ↳ 74:22 }
5 fn api::post_message::post_message() { //
    ↳ program/src/api/post_message.rs:75:1: 146:2 }
6 fn <T as solitaire::Creatable<'a, K>>::create() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/s
    ↳ 150:6 }
7 fn solana_program::program::invoke_signed() { //
    ↳ /home/ubuntu/.cargo/registry/src/github.com-
    ↳ 1ecc6299db9ec823/solana-program-
    ↳ 1.7.0/src/program.rs:15:1: 55:2
    ↳ }

```

```
8      fn
      ↪ solana_program::account_info::AccountInfo::<'a>::try_borrow_mut_data() { //
      ↪ /home/ubuntu/.cargo/registry/src/github.com-
      ↪ 1ecc6299db9ec823/solana-program-1.7.0/src/account_info.rs:111:5:
      ↪ 115:6 }
```

- description:

message

- link:

GitHub Link to be added.

- alleviation:

Description of the bug here.

Issue: TYP_CVE_2: InstructionId - Instruction id not checked error

Category	Severity	Status
Instruction id issue	Critical	UnResolved

• Location

/home/ubuntu/.cargo/registry/src/github.com-1ecc6299db9ec823/solana-program-1.7.0/src/account_info.rs:111:5:
115:6

```

111 pub fn try_borrow_mut_data(&self) -> Result<RefMut<&'a mut [u8]>,
    ↳ ProgramError> {
112     self.data
113         .try_borrow_mut()
114         .map_err(|_| ProgramError::AccountBorrowFailed)
115 }
116

```

• Call Stack

```

1 fn entrypoint() { // /home/ubuntu/.cargo/registry/src/github.com-
    ↳ 1ecc6299db9ec823/solana-program-1.7.0/src/entrypoint.rs:46:9: 53:10
    ↳ }
2 fn instruction::solitaire() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:101:13:
    ↳ 108:14 }
3 fn instruction::dispatch() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:89:
    ↳ 99:14 }
4 fn instruction::PostMessage::execute() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:
    ↳ 74:22 }
5 fn api::post_message::post_message() { //
    ↳ program/src/api/post_message.rs:75:1: 146:2 }
6 fn solana_program::program::invoke() { //
    ↳ /home/ubuntu/.cargo/registry/src/github.com-
    ↳ 1ecc6299db9ec823/solana-program-
    ↳ 1.7.0/src/program.rs:7:1: 9:2
    ↳ }
7 fn solana_program::program::invoke_signed() { //
    ↳ /home/ubuntu/.cargo/registry/src/github.com-
    ↳ 1ecc6299db9ec823/solana-program-
    ↳ 1.7.0/src/program.rs:15:1: 55:2
    ↳ }

```

```

8      fn
      ↪ solana_program::account_info::AccountInfo::<'a>::try_borrow_mut_data() { //
      ↪ /home/ubuntu/.cargo/registry/src/github.com-
      ↪ 1ecc6299db9ec823/solana-program-1.7.0/src/account_info.rs:111:5:
      ↪ 115:6 }
9

```

- description:

message

- link:

GitHub Link to be added.

- alleviation:

Description of the bug here.

Issue: TYP_CVE_3: InstructionId - Instruction id not checked error

Category	Severity	Status
Instruction id issue	Critical	UnResolved

• Location

/home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/processors/peel.rs:192:5:
236:6

```

192 fn peel<I>(ctx: &'c mut Context<'a, 'b, 'c, I>) -> Result<Self> {
193     if ctx.immutable && ctx.info().is_writable {
194         return Err(
195             SolitaireError::InvalidMutability(*ctx.info().key,
196                 ↪ ctx.info().is_writable).into(),
197         );
198     }
199     // If we're initializing the type, we should emit system/rent as
200     ↪ deps.
201     let (initialized, data): (bool, T) = match IsInitialized {
202         AccountState::Uninitialized => {
203             if **ctx.info().lamports.borrow() != 0 {
204                 return
205                 ↪ Err(SolitaireError::AlreadyInitialized(*ctx.info().key));
206             }
207             (false, T::default())
208         }
209         AccountState::Initialized => {
210             (true, T::try_from_slice(&mut
211 ↪ *ctx.info().data.borrow_mut()?))
212         }
213         AccountState::MaybeInitialized => {
214             if **ctx.info().lamports.borrow() == 0 {
215                 (false, T::default())
216             } else {
217                 (true, T::try_from_slice(&mut
218 ↪ *ctx.info().data.borrow_mut()?))
219             }
220         }
221     }

```

```

217     };
218
219     if initialized {
220         match data.owner() {
221             AccountOwner::This => {
222                 if ctx.info().owner != ctx.this {
223                     return
224                     ↪ Err(SolitaireError::InvalidOwner(*ctx.info().owner));
225                 }
226             }
227             AccountOwner::Other(v) => {
228                 if *ctx.info().owner != v {
229                     return
230                     ↪ Err(SolitaireError::InvalidOwner(*ctx.info().owner));
231                 }
232             }
233             AccountOwner::Any => {}
234         };
235     }
236
237     Ok(Data(Box::new(ctx.info().clone()), data))

```

- Call Stack

```

1  fn entrypoint() { // /home/ubuntu/.cargo/registry/src/github.com-
  ↪ 1ecc6299db9ec823/solana-program-1.7.0/src/entrypoint.rs:46:9: 53:10
  ↪ }
2  fn instruction::solitaire() { //
  ↪ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:101:13:
  ↪ 108:14 }
3  fn instruction::dispatch() { //
  ↪ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:89:
  ↪ 99:14 }
4  fn instruction::PostVAA::execute() { //
  ↪ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:
  ↪ 74:22 }
5      fn <api::post_vaa::PostVAA<'b> as
  ↪ solitaire::FromAccounts<'a, 'b, 'c>::from() { //
  ↪ program/src/api/post_vaa.rs:54:10: 54:22 }
6      fn <solitaire::Data<'b, T, IsInitialized> as
  ↪ solitaire::Peel<'a, 'b, 'c>::peel() { //
  ↪ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/s
  ↪ 236:6 }

```


7

- description:

message

- link:

GitHub Link to be added.

- alleviation:

Description of the bug here.

Issue: TYP_CVE_4: InstructionId - Instruction id not checked error

Category	Severity	Status
Instruction id issue	Critical	UnResolved

• Location

/home/ubuntu/.cargo/registry/src/github.com-1ecc6299db9ec823/solana-program-1.7.0/src/account_info.rs:111:5:
115:6

```

111 pub fn try_borrow_mut_data(&self) -> Result<RefMut<&'a mut [u8]>,
    ↳ ProgramError> {
112     self.data
113         .try_borrow_mut()
114         .map_err(|_| ProgramError::AccountBorrowFailed)
115 }
116

```

• Call Stack

```

1 fn entrypoint() { // /home/ubuntu/.cargo/registry/src/github.com-
    ↳ 1ecc6299db9ec823/solana-program-1.7.0/src/entrypoint.rs:46:9: 53:10
    ↳ }
2 fn instruction::solitaire() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:101:13:
    ↳ 108:14 }
3 fn instruction::dispatch() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:89:
    ↳ 99:14 }
4 fn instruction::PostVAA::execute() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:
    ↳ 74:22 }
5 fn api::post_vaa::post_vaa() { //
    ↳ program/src/api/post_vaa.rs:104:1: 156:2 }
6 fn <T as solitaire::Creatable<'a, K>>::create() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/s
    ↳ 150:6 }
7 fn solana_program::program::invoke_signed() { //
    ↳ /home/ubuntu/.cargo/registry/src/github.com-
    ↳ 1ecc6299db9ec823/solana-program-
    ↳ 1.7.0/src/program.rs:15:1: 55:2
    ↳ }

```

```

8      fn
      ↪ solana_program::account_info::AccountInfo::<'a>::try_borrow_mut_data() { //
      ↪ /home/ubuntu/.cargo/registry/src/github.com-
      ↪ 1ecc6299db9ec823/solana-program-1.7.0/src/account_info.rs:111:5:
      ↪ 115:6 }
9

```

- description:

message

- link:

GitHub Link to be added.

- alleviation:

Description of the bug here.

Issue: TYP_CVE_5: InstructionId - Instruction id not checked error

Category	Severity	Status
Instruction id issue	Critical	UnResolved

• Location

/home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/processors/peel.rs:246:5:
260:6

```

246 fn persist(&self, program_id: &Pubkey) -> Result<()> {
247     // TODO: Introduce Mut<> to solve the check we really want to make
248     ↪ here.
249     if self.0.owner != program_id {
250         return Ok(());
251     }
252
253     // It is also a malformed program to attempt to write to a
254     ↪ non-writeable account.
255     if !self.0.is_writable {
256         return Ok(());
257     }
258
259     self.1.serialize(&mut *self.0.data.borrow_mut())?;
260
261     Ok(())
262 }
```

• Call Stack

```

1 fn entrypoint(){// /home/ubuntu/.cargo/registry/src/github.com-
  ↪ 1ecc6299db9ec823/solana-program-1.7.0/src/entrypoint.rs:46:9: 53:10
  ↪ }
2 fn instruction::solitaire(){//
  ↪ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:101:13:
  ↪ 108:14 }
3 fn instruction::dispatch(){//
  ↪ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:89:
  ↪ 99:14 }
```

4
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```
fn instruction::PostVAA::execute() {  
    ↪ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs  
    ↪ 74:22 }  
    fn <api::post_vaa::PostVAA<'b> as  
    ↪ solitaire::Persist>::persist() {  
    ↪ program/src/api/post_vaa.rs:54:10: 54:22 }  
    fn <solitaire::Data<'b, T, IsInitialized> as  
    ↪ solitaire::Peel<'a, 'b, 'c>::persist() {  
    ↪ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/s  
    ↪ 260:6 }
```

- description:

message

- link:

GitHub Link to be added.

- alleviation:

Description of the bug here.

Issue: TYP_CVE_6: InstructionId - Instruction id not checked error

Category	Severity	Status
Instruction id issue	Critical	UnResolved

- Location

/home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/processors/peel.rs:192:5:
236:6

```

192 fn peel<I>(ctx: &'c mut Context<'a, 'b, 'c, I>) -> Result<Self> {
193     if ctx.immutable && ctx.info().is_writable {
194         return Err(
195             SolitaireError::InvalidMutability(*ctx.info().key,
196                 ↪ ctx.info().is_writable).into(),
197         );
198     }
199     // If we're initializing the type, we should emit system/rent as
200     ↪ deps.
201     let (initialized, data): (bool, T) = match IsInitialized {
202         AccountState::Uninitialized => {
203             if **ctx.info().lamports.borrow() != 0 {
204                 return
205                 ↪ Err(SolitaireError::AlreadyInitialized(*ctx.info().key));
206             }
207             (false, T::default())
208         }
209         AccountState::Initialized => {
210             (true, T::try_from_slice(&mut
211 ↪ *ctx.info().data.borrow_mut()?))
212         }
213         AccountState::MaybeInitialized => {
214             if **ctx.info().lamports.borrow() == 0 {
215                 (false, T::default())
216             } else {
217                 (true, T::try_from_slice(&mut
218 ↪ *ctx.info().data.borrow_mut()?))
219             }
220         }
221     }

```

```

217     };
218
219     if initialized {
220         match data.owner() {
221             AccountOwner::This => {
222                 if ctx.info().owner != ctx.this {
223                     return
224                     ↪ Err(SolitaireError::InvalidOwner(*ctx.info().owner));
225                 }
226             }
227             AccountOwner::Other(v) => {
228                 if *ctx.info().owner != v {
229                     return
230                     ↪ Err(SolitaireError::InvalidOwner(*ctx.info().owner));
231                 }
232             }
233             AccountOwner::Any => {}
234         };
235     }
236
237     Ok(Data(Box::new(ctx.info().clone()), data))

```

- Call Stack

```

1  fn entrypoint() { // /home/ubuntu/.cargo/registry/src/github.com-
  ↪ 1ecc6299db9ec823/solana-program-1.7.0/src/entrypoint.rs:46:9: 53:10
  ↪ }
2  fn instruction::solitaire() { //
  ↪ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:101:13:
  ↪ 108:14 }
3  fn instruction::dispatch() { //
  ↪ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:89:
  ↪ 99:14 }
4  fn instruction::SetFees::execute() { //
  ↪ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:
  ↪ 74:22 }
5      fn <api::governance::SetFees<'b> as
  ↪ solitaire::FromAccounts<'a, 'b, 'c>::from() { //
  ↪ program/src/api/governance.rs:204:10: 204:22 }
6      fn <vaa::ClaimableVAA<'b, T> as solitaire::Peel<'a,
  ↪ 'b, 'c>::peel() { // program/src/vaa.rs:148:10:
  ↪ 148:22 }

```

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```
fn <vaa::ClaimableVAA<'b, T> as  
↳ solitaire::FromAccounts<'a, 'b,  
↳ 'c>>::from() { // program/src/vaa.rs:148:10:  
↳ 148:22 }  
fn <vaa::PayloadMessage<'b, T> as solitaire::Peel<'a, 'b,  
↳ 'c>>::peel() { // program/src/vaa.rs:116:5: 124:6 }  
fn <solitaire::Data<'b, T, IsInitialized> as  
↳ solitaire::Peel<'a, 'b, 'c>>::peel() { //  
↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/processor  
↳ 236:6 }
```

- description:

message

- link:

GitHub Link to be added.

- alleviation:

Description of the bug here.

Issue: TYP_CVE_7: InstructionId - Instruction id not checked error

Category	Severity	Status
Instruction id issue	Critical	UnResolved

- Location

/home/ubuntu/.cargo/registry/src/github.com-1ecc6299db9ec823/solana-program-1.7.0/src/account_info.rs:111:5: 115:6

```

111 pub fn try_borrow_mut_data(&self) -> Result<RefMut<&'a mut [u8]>,
    ↳ ProgramError> {
112     self.data
113     .try_borrow_mut()
114     .map_err(|_| ProgramError::AccountBorrowFailed)
115 }
116

```

- Call Stack

```

1 fn entrypoint() { // /home/ubuntu/.cargo/registry/src/github.com-
    ↳ 1ecc6299db9ec823/solana-program-1.7.0/src/entrypoint.rs:46:9: 53:10
    ↳ }
2 fn instruction::solitaire() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:101:13:
    ↳ 108:14 }
3 fn instruction::dispatch() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:89:
    ↳ 99:14 }
4 fn instruction::SetFees::execute() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:
    ↳ 74:22 }
5     fn api::governance::set_fees() { //
    ↳ program/src/api/governance.rs:222:1: 229:2 }
6     fn vaa::ClaimableVAA::<'b, T>::claim() { //
    ↳ program/src/vaa.rs:187:5: 206:6 }
7     fn <T as solitaire::Creatable<'a,
    ↳ K>>::create() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:
    ↳ 150:6 }

```

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```
fn solana_program::program::invoke_signed(){//  
    ↪ /home/ubuntu/.cargo/registry/src/github.com-  
    ↪ 1ecc6299db9ec823/solana-program-1.7.0/src/program.rs:15:1: 55:2  
    ↪ }  
fn  
    ↪ solana_program::account_info::AccountInfo:::<'a>::try_borrow_mut_data(){/  
    ↪ /home/ubuntu/.cargo/registry/src/github.com-  
    ↪ 1ecc6299db9ec823/solana-program-  
    ↪ 1.7.0/src/account_info.rs:111:5: 115:6  
    ↪ }
```

- description:

message

- link:

GitHub Link to be added.

- alleviation:

Description of the bug here.

Issue: TYP_CVE_8: InstructionId - Instruction id not checked error

Category	Severity	Status
Instruction id issue	Critical	UnResolved

• Location

/home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/processors/peel.rs:246:5:
260:6

```

246 fn persist(&self, program_id: &Pubkey) -> Result<()> {
247     // TODO: Introduce Mut<> to solve the check we really want to make
248     ↪ here.
249     if self.0.owner != program_id {
250         return Ok(());
251     }
252
253     // It is also a malformed program to attempt to write to a
254     ↪ non-writeable account.
255     if !self.0.is_writable {
256         return Ok(());
257     }
258
259     self.1.serialize(&mut *self.0.data.borrow_mut())?;
260
261     Ok(())
262 }
```

• Call Stack

```

1 fn entrypoint(){// /home/ubuntu/.cargo/registry/src/github.com-
  ↪ 1ecc6299db9ec823/solana-program-1.7.0/src/entrypoint.rs:46:9: 53:10
  ↪ }
2 fn instruction::solitaire(){//
  ↪ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:101:13:
  ↪ 108:14 }
3 fn instruction::dispatch(){//
  ↪ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:89:
  ↪ 99:14 }
```

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```

fn instruction::SetFees::execute(){//
↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs
↳ 74:22 }

fn <api::governance::SetFees<'b> as
↳ solitaire::Persist>::persist(){//
↳ program/src/api/governance.rs:204:10: 204:22 }

fn <vaa::ClaimableVAA<'b, T> as solitaire::Peel<'a,
↳ 'b, 'c>>::persist(){//
↳ program/src/vaa.rs:148:10: 148:22 }

fn <vaa::ClaimableVAA<'b, T> as
↳ solitaire::Persist>::persist(){//
↳ program/src/vaa.rs:148:10: 148:22 }

fn <vaa::PayloadMessage<'b, T> as solitaire::Peel<'a, 'b,
↳ 'c>>::persist(){// program/src/vaa.rs:130:5: 132:6 }

fn <solitaire::Data<'b, T, IsInitialized> as
↳ solitaire::Peel<'a, 'b, 'c>>::persist(){//
↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/processor
↳ 260:6 }

```

- description:

message

- link:

GitHub Link to be added.

- alleviation:

Description of the bug here.

Issue: TYP_CVE_9: InstructionId - Instruction id not checked error

Category	Severity	Status
Instruction id issue	Critical	UnResolved

• Location

/home/ubuntu/.cargo/registry/src/github.com-1ecc6299db9ec823/solana-program-1.7.0/src/account_info.rs:77:5:
79:6

```

77 pub fn data_len(&self) -> usize {
78     self.data.borrow().len()
79 }
80

```

• Call Stack

```

1 fn entrypoint() { // /home/ubuntu/.cargo/registry/src/github.com-
  ↳ 1ecc6299db9ec823/solana-program-1.7.0/src/entrypoint.rs:46:9: 53:10
  ↳ }
2 fn instruction::solitaire() { //
  ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:101:13:
  ↳ 108:14 }
3 fn instruction::dispatch() { //
  ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:89:
  ↳ 99:14 }
4 fn instruction::TransferFees::execute() { //
  ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs
  ↳ 74:22 }
5 fn api::governance::transfer_fees() { //
  ↳ program/src/api/governance.rs:258:1: 295:2 }
6 fn
  ↳ solana_program::account_info::AccountInfo::<'a>::data_len() {
  ↳ /home/ubuntu/.cargo/registry/src/github.com-
  ↳ 1ecc6299db9ec823/solana-program-
  ↳ 1.7.0/src/account_info.rs:77:5: 79:6
  ↳ }
7

```

• description:

message

- link:

GitHub Link to be added.

- alleviation:

Description of the bug here.

Issue: TYP_CVE_10: InstructionId - Instruction id not checked error

Category	Severity	Status
Instruction id issue	Critical	UnResolved

- Location

/home/ubuntu/.cargo/registry/src/github.com-1ecc6299db9ec823/solana-program-1.7.0/src/account_info.rs:111:5: 115:6

```

111 pub fn try_borrow_mut_data(&self) -> Result<RefMut<&'a mut [u8]>,
    ↳ ProgramError> {
112     self.data
113         .try_borrow_mut()
114         .map_err(|_| ProgramError::AccountBorrowFailed)
115 }
116

```

- Call Stack

```

1 fn entrypoint() { // /home/ubuntu/.cargo/registry/src/github.com-
    ↳ 1ecc6299db9ec823/solana-program-1.7.0/src/entrypoint.rs:46:9: 53:10
    ↳ }
2 fn instruction::solitaire() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:101:13:
    ↳ 108:14 }
3 fn instruction::dispatch() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:89:
    ↳ 99:14 }
4 fn instruction::TransferFees::execute() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:
    ↳ 74:22 }
5     fn api::governance::transfer_fees() { //
        ↳ program/src/api/governance.rs:258:1: 295:2 }
6     fn vaa::ClaimableVAA::<'b, T>::claim() { //
        ↳ program/src/vaa.rs:187:5: 206:6 }
7     fn <T as solitaire::Creatable<'a,
        ↳ K>>::create() { //
        ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/progr
        ↳ 150:6 }

```

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```
fn solana_program::program::invoke_signed(){//  
  ↪ /home/ubuntu/.cargo/registry/src/github.com-  
  ↪ 1ecc6299db9ec823/solana-program-1.7.0/src/program.rs:15:1: 55:2  
  ↪ }  
fn  
  ↪ solana_program::account_info::AccountInfo:::<'a>::try_borrow_mut_data(){/  
  ↪ /home/ubuntu/.cargo/registry/src/github.com-  
  ↪ 1ecc6299db9ec823/solana-program-  
  ↪ 1.7.0/src/account_info.rs:111:5: 115:6  
  ↪ }
```

- description:

message

- link:

GitHub Link to be added.

- alleviation:

Description of the bug here.

Issue: TYP_CVE_11: InstructionId - Instruction id not checked error

Category	Severity	Status
Instruction id issue	Critical	UnResolved

• Location

/home/ubuntu/.cargo/registry/src/github.com-1ecc6299db9ec823/solana-program-1.7.0/src/account_info.rs:111:5:
115:6

```

111 pub fn try_borrow_mut_data(&self) -> Result<RefMut<&'a mut [u8]>,
    ↳ ProgramError> {
112     self.data
113     .try_borrow_mut()
114     .map_err(|_| ProgramError::AccountBorrowFailed)
115 }
116

```

• Call Stack

```

1 fn entrypoint() { // /home/ubuntu/.cargo/registry/src/github.com-
    ↳ 1ecc6299db9ec823/solana-program-1.7.0/src/entrypoint.rs:46:9: 53:10
    ↳ }
2 fn instruction::solitaire() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:101:13:
    ↳ 108:14 }
3 fn instruction::dispatch() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:89:
    ↳ 99:14 }
4 fn instruction::TransferFees::execute() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:
    ↳ 74:22 }
5 fn api::governance::transfer_fees() { //
    ↳ program/src/api/governance.rs:258:1: 295:2 }
6 fn solana_program::program::invoke_signed() { //
    ↳ /home/ubuntu/.cargo/registry/src/github.com-
    ↳ 1ecc6299db9ec823/solana-program-
    ↳ 1.7.0/src/program.rs:15:1: 55:2
    ↳ }
7 fn
    ↳ solana_program::account_info::AccountInfo::<'a>::try_bor
    ↳ /home/ubuntu/.cargo/registry/src/github.com-
    ↳ 1ecc6299db9ec823/solana-program-
    ↳ 1.7.0/src/account_info.rs:111:5: 115:6
    ↳ }

```

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- description:

message

- link:

GitHub Link to be added.

- alleviation:

Description of the bug here.

Issue: TYP_CVE_12: InstructionId - Instruction id not checked error

Category	Severity	Status
Instruction id issue	Critical	UnResolved

- Location

/home/ubuntu/.cargo/registry/src/github.com-1ecc6299db9ec823/solana-program-1.7.0/src/account_info.rs:111:5: 115:6

```

111 pub fn try_borrow_mut_data(&self) -> Result<RefMut<&'a mut [u8]>,
    ↳ ProgramError> {
112     self.data
113     .try_borrow_mut()
114     .map_err(|_| ProgramError::AccountBorrowFailed)
115 }
116

```

- Call Stack

```

1 fn entrypoint() { // /home/ubuntu/.cargo/registry/src/github.com-
    ↳ 1ecc6299db9ec823/solana-program-1.7.0/src/entrypoint.rs:46:9: 53:10
    ↳ }
2 fn instruction::solitaire() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:101:13:
    ↳ 108:14 }
3 fn instruction::dispatch() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:89:
    ↳ 99:14 }
4 fn instruction::UpgradeContract::execute() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:
    ↳ 74:22 }
5     fn api::governance::upgrade_contract() { //
        ↳ program/src/api/governance.rs:96:1: 120:2 }
6     fn vaa::ClaimableVAA::<'b, T>::claim() { //
        ↳ program/src/vaa.rs:187:5: 206:6 }
7     fn <T as solitaire::Creatable<'a,
        ↳ K>>::create() { //
        ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/progr
        ↳ 150:6 }

```

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```
fn solana_program::program::invoke_signed(){//  
    ↪ /home/ubuntu/.cargo/registry/src/github.com-  
    ↪ 1ecc6299db9ec823/solana-program-1.7.0/src/program.rs:15:1: 55:2  
    ↪ }  
fn  
    ↪ solana_program::account_info::AccountInfo:::<'a>::try_borrow_mut_data(){/  
    ↪ /home/ubuntu/.cargo/registry/src/github.com-  
    ↪ 1ecc6299db9ec823/solana-program-  
    ↪ 1.7.0/src/account_info.rs:111:5: 115:6  
    ↪ }
```

- description:

message

- link:

GitHub Link to be added.

- alleviation:

Description of the bug here.

Issue: TYP_CVE_13: InstructionId - Instruction id not checked error

Category	Severity	Status
Instruction id issue	Critical	UnResolved

• Location

/home/ubuntu/.cargo/registry/src/github.com-1ecc6299db9ec823/solana-program-1.7.0/src/account_info.rs:111:5: 115:6

```

111 pub fn try_borrow_mut_data(&self) -> Result<RefMut<&'a mut [u8]>,
    ↳ ProgramError> {
112     self.data
113         .try_borrow_mut()
114         .map_err(|_| ProgramError::AccountBorrowFailed)
115 }
116

```

• Call Stack

```

1 fn entrypoint() { // /home/ubuntu/.cargo/registry/src/github.com-
    ↳ 1ecc6299db9ec823/solana-program-1.7.0/src/entrypoint.rs:46:9: 53:10
    ↳ }
2 fn instruction::solitaire() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:101:13:
    ↳ 108:14 }
3 fn instruction::dispatch() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:89:
    ↳ 99:14 }
4 fn instruction::UpgradeContract::execute() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:
    ↳ 74:22 }
5 fn api::governance::upgrade_contract() { //
    ↳ program/src/api/governance.rs:96:1: 120:2 }
6 fn solana_program::program::invoke_signed() { //
    ↳ /home/ubuntu/.cargo/registry/src/github.com-
    ↳ 1ecc6299db9ec823/solana-program-
    ↳ 1.7.0/src/program.rs:15:1: 55:2
    ↳ }
7 fn
    ↳ solana_program::account_info::AccountInfo::<'a>::try_bor
    ↳ /home/ubuntu/.cargo/registry/src/github.com-
    ↳ 1ecc6299db9ec823/solana-program-
    ↳ 1.7.0/src/account_info.rs:111:5: 115:6
    ↳ }

```

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- description:

message

- link:

GitHub Link to be added.

- alleviation:

Description of the bug here.

Issue: TYP_CVE_14: InstructionId - Instruction id not checked error

Category	Severity	Status
Instruction id issue	Critical	UnResolved

• Location

/home/ubuntu/.cargo/registry/src/github.com-1ecc6299db9ec823/solana-program-1.7.0/src/account_info.rs:111:5: 115:6

```

111 pub fn try_borrow_mut_data(&self) -> Result<RefMut<&'a mut [u8]>,
    ↳ ProgramError> {
112     self.data
113     .try_borrow_mut()
114     .map_err(|_| ProgramError::AccountBorrowFailed)
115 }
116

```

• Call Stack

```

1 fn entrypoint() { // /home/ubuntu/.cargo/registry/src/github.com-
    ↳ 1ecc6299db9ec823/solana-program-1.7.0/src/entrypoint.rs:46:9: 53:10
    ↳ }
2 fn instruction::solitaire() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:101:13:
    ↳ 108:14 }
3 fn instruction::dispatch() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:89:
    ↳ 99:14 }
4 fn instruction::UpgradeGuardianSet::execute() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:
    ↳ 74:22 }
5     fn api::governance::upgrade_guardian_set() { //
        ↳ program/src/api/governance.rs:146:1: 202:2 }
6     fn vaa::ClaimableVAA::<'b, T>::claim() { //
        ↳ program/src/vaa.rs:187:5: 206:6 }
7     fn <T as solitaire::Creatable<'a,
        ↳ K>::create() { //
        ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/progr
        ↳ 150:6 }

```

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```
fn solana_program::program::invoke_signed(){//  
    ↪ /home/ubuntu/.cargo/registry/src/github.com-  
    ↪ 1ecc6299db9ec823/solana-program-1.7.0/src/program.rs:15:1: 55:2  
    ↪ }  
fn  
    ↪ solana_program::account_info::AccountInfo:::<'a>::try_borrow_mut_data(){/  
    ↪ /home/ubuntu/.cargo/registry/src/github.com-  
    ↪ 1ecc6299db9ec823/solana-program-  
    ↪ 1.7.0/src/account_info.rs:111:5: 115:6  
    ↪ }
```

- description:

message

- link:

GitHub Link to be added.

- alleviation:

Description of the bug here.

Issue: TYP_CVE_15: InstructionId - Instruction id not checked error

Category	Severity	Status
Instruction id issue	Critical	UnResolved

• Location

/home/ubuntu/.cargo/registry/src/github.com-1ecc6299db9ec823/solana-program-1.7.0/src/account_info.rs:111:5: 115:6

```

111 pub fn try_borrow_mut_data(&self) -> Result<RefMut<&'a mut [u8]>,
    ↳ ProgramError> {
112     self.data
113         .try_borrow_mut()
114         .map_err(|_| ProgramError::AccountBorrowFailed)
115 }
116

```

• Call Stack

```

1 fn entrypoint() { // /home/ubuntu/.cargo/registry/src/github.com-
    ↳ 1ecc6299db9ec823/solana-program-1.7.0/src/entrypoint.rs:46:9: 53:10
    ↳ }
2 fn instruction::solitaire() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:101:13:
    ↳ 108:14 }
3 fn instruction::dispatch() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:89:
    ↳ 99:14 }
4 fn instruction::UpgradeGuardianSet::execute() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:
    ↳ 74:22 }
5 fn api::governance::upgrade_guardian_set() { //
    ↳ program/src/api/governance.rs:146:1: 202:2 }
6 fn <T as solitaire::Creatable<'a, K>>::create() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/s
    ↳ 150:6 }
7 fn solana_program::program::invoke_signed() { //
    ↳ /home/ubuntu/.cargo/registry/src/github.com-
    ↳ 1ecc6299db9ec823/solana-program-
    ↳ 1.7.0/src/program.rs:15:1: 55:2
    ↳ }

```

```

8      fn
      ↪ solana_program::account_info::AccountInfo::<'a>::try_borrow_mut_data() { //
      ↪ /home/ubuntu/.cargo/registry/src/github.com-
      ↪ 1ecc6299db9ec823/solana-program-1.7.0/src/account_info.rs:111:5:
      ↪ 115:6 }
9

```

- description:

message

- link:

GitHub Link to be added.

- alleviation:

Description of the bug here.

Issue: TYP_CVE_16: InstructionId - Instruction id not checked error

Category	Severity	Status
Instruction id issue	Critical	UnResolved

- Location

/home/ubuntu/.cargo/registry/src/github.com-1ecc6299db9ec823/solana-program-1.7.0/src/account_info.rs:111:5: 115:6

```

111 pub fn try_borrow_mut_data(&self) -> Result<RefMut<&'a mut [u8]>,
    ↳ ProgramError> {
112     self.data
113     .try_borrow_mut()
114     .map_err(|_| ProgramError::AccountBorrowFailed)
115 }
116

```

- Call Stack

```

1 fn entrypoint(){// /home/ubuntu/.cargo/registry/src/github.com-
    ↳ 1ecc6299db9ec823/solana-program-1.7.0/src/entrypoint.rs:46:9: 53:10
    ↳ }
2 fn instruction::solitaire(){//
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:101:13:
    ↳ 108:14 }
3 fn instruction::dispatch(){//
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:89:
    ↳ 99:14 }
4 fn instruction::VerifySignatures::execute(){//
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:
    ↳ 74:22 }
5     fn api::verify_signature::verify_signatures(){//
    ↳ program/src/api/verify_signature.rs:68:1: 223:2 }
6     fn
    ↳ solana_program::account_info::AccountInfo::<'a>::try_borrow_
    ↳ /home/ubuntu/.cargo/registry/src/github.com-
    ↳ 1ecc6299db9ec823/solana-program-
    ↳ 1.7.0/src/account_info.rs:111:5: 115:6
    ↳ }

```

7

- description:

message

- link:

GitHub Link to be added.

- alleviation:

Description of the bug here.

Issue: TYP_CVE_17: InstructionId - Instruction id not checked error

Category	Severity	Status
Instruction id issue	Critical	UnResolved

• Location

/home/ubuntu/.cargo/registry/src/github.com-1ecc6299db9ec823/solana-program-1.7.0/src/account_info.rs:111:5: 115:6

```

111 pub fn try_borrow_mut_data(&self) -> Result<RefMut<&'a mut [u8]>,
    ↳ ProgramError> {
112     self.data
113         .try_borrow_mut()
114         .map_err(|_| ProgramError::AccountBorrowFailed)
115 }
116

```

• Call Stack

```

1 fn entrypoint() { // /home/ubuntu/.cargo/registry/src/github.com-
    ↳ 1ecc6299db9ec823/solana-program-1.7.0/src/entrypoint.rs:46:9: 53:10
    ↳ }
2 fn instruction::solitaire() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:101:13:
    ↳ 108:14 }
3 fn instruction::dispatch() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:89:
    ↳ 99:14 }
4 fn instruction::VerifySignatures::execute() { //
    ↳ /home/ubuntu/VRust/vrust/wormhole/solana/solitaire/program/src/macros.rs:
    ↳ 74:22 }
5 fn api::verify_signature::verify_signatures() { //
    ↳ program/src/api/verify_signature.rs:68:1: 223:2 }
6 fn solana_program::program::invoke() { //
    ↳ /home/ubuntu/.cargo/registry/src/github.com-
    ↳ 1ecc6299db9ec823/solana-program-
    ↳ 1.7.0/src/program.rs:7:1: 9:2
    ↳ }
7 fn solana_program::program::invoke_signed() { //
    ↳ /home/ubuntu/.cargo/registry/src/github.com-
    ↳ 1ecc6299db9ec823/solana-program-
    ↳ 1.7.0/src/program.rs:15:1: 55:2
    ↳ }

```

```
8      fn
      ↪ solana_program::account_info::AccountInfo::<'a>::try_borrow_mut_data() { //
      ↪ /home/ubuntu/.cargo/registry/src/github.com-
      ↪ 1ecc6299db9ec823/solana-program-1.7.0/src/account_info.rs:111:5:
      ↪ 115:6 }
```

- description:

message

- link:

GitHub Link to be added.

- alleviation:

Description of the bug here.

Appendix

Copied from <https://leaderboard.certik.io/projects/aave>

Finding Categories

Gas Optimization

Gas Optimization findings do not affect the functionality of the code but generate different, more optimal EVM opcodes resulting in a reduction on the total gas cost of a transaction.

Mathematical Operations

Mathematical Operation findings relate to mishandling of math formulas, such as overflows, incorrect operations etc.

Logical Issue

Logical Issue findings detail a fault in the logic of the linked code, such as an incorrect notion on how `block.timestamp` works.

Language Specific

Language Specific findings are issues that would only arise within Solidity, i.e. incorrect usage of `private` or `delete`.

Coding Style

Coding Style findings usually do not affect the generated byte-code but rather comment on how to make the codebase more legible and, as a result, easily maintainable.

Checksum Calculation Method

The “Checksum” field in the “Audit Scope” section is calculated as the SHA-256 (Secure Hash Algorithm 2 with digest size of 256 bits) digest of the content of each file hosted in the listed source repository under the specified commit.

The result is hexadecimal encoded and is the same as the output of the Linux “sha256sum” command against the target file.

Disclaimer

Copied from <https://leaderboard.certik.io/projects/aave>

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