

Copying memory in the EVM, how hard can *that* be?

Spoiler: not very

Elia Anzuoni

Smart contract auditor @ ChainSecurity

What are your options?

Before Cancun

(MLOAD+MSTORE) loop

Code size



Gas (small memory)



Gas (large memory)



After Cancun

Identity precompile
CALL(..., 0x04, ...)

Code size



Gas (small memory)



Gas (large memory)



MCOPY opcode

Code size



Gas (small memory)



Gas (large memory)



Some numbers

```
for(; length >= 32; length -= 32) {  
    assembly {  
        mstore(dest, mload(src))  
    }  
    dest += 32;  
    src += 32;  
}
```

Utility function used in
solidity-stringutils

Gas = $286w + 107$ (+480)
Code size = 121 B

```
assembly {  
    let i := 0  
    for {} lt(i, length) { i := add(i, 32) }  
    {  
        mstore(add(dst, i), mload(add(src, i)))  
    }  
    mstore(add(dst, length), 0)  
}
```

Yul function generated by Solidity
for legacy EVM versions

Gas = $67w + 53$
Code size = 34 B

```
assembly {  
    let success := staticcall(  
        gas(), 0x04,  
        src, size,  
        dst, size  
    )  
}
```

Used by seaport-types
Also Vyper for legacy EVM

Gas = $3w + 180$
Code size = 28 B



DISCLAIMER

- No memory-expansion cost
- Opcode prices change

MCOPY opcode (+setup):

Gas = $3w + 9$
Code size = 7 B



Thank you!



Questions?
Answers?

Elia Anzuoni

Smart contract auditor @ ChainSecurity



Thank you!



Your Name

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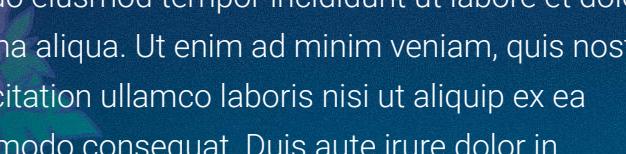
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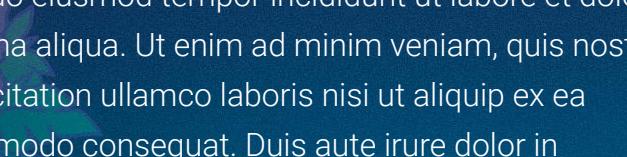
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“Number rules the universe.”
— Pythagoras

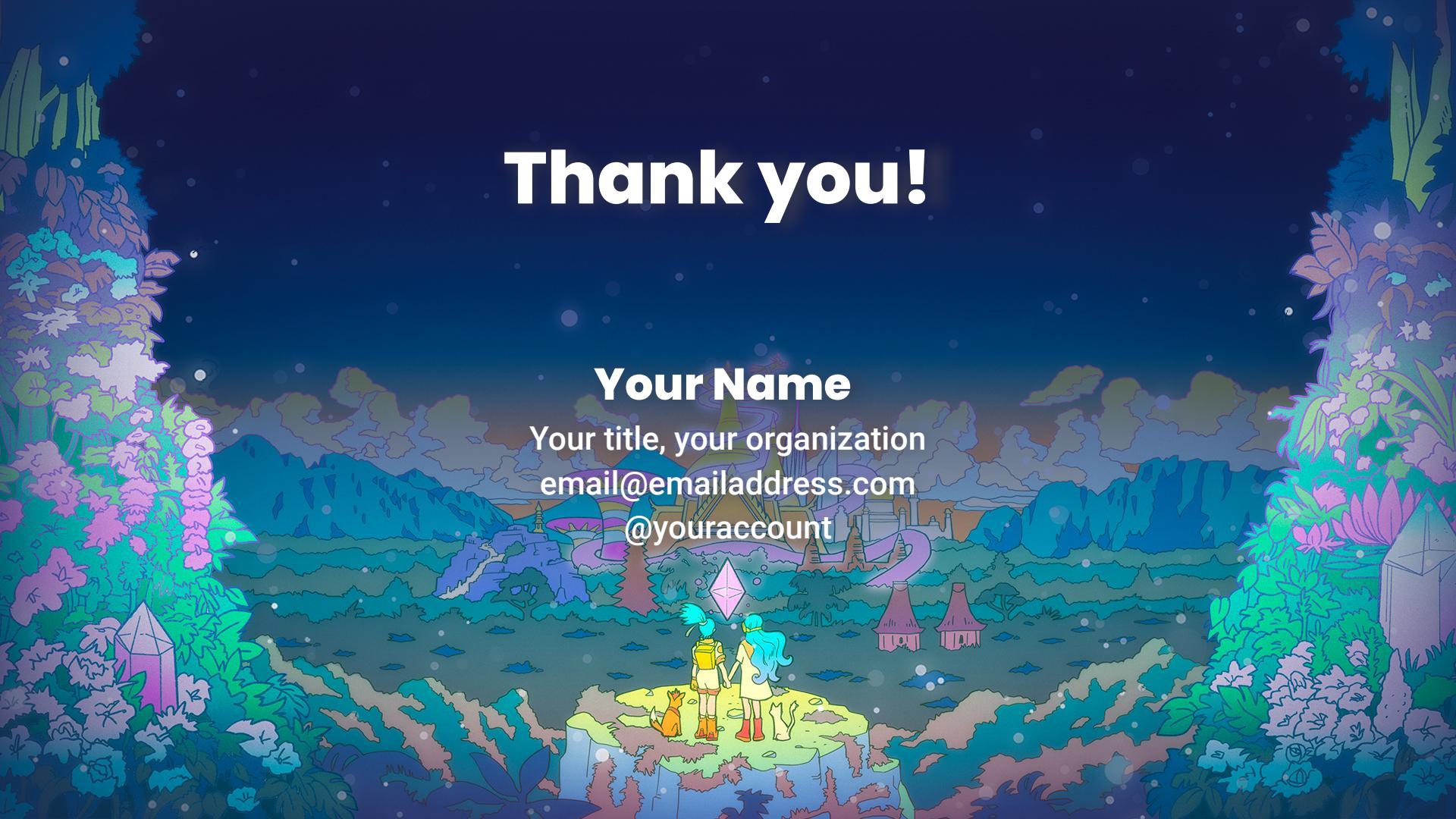
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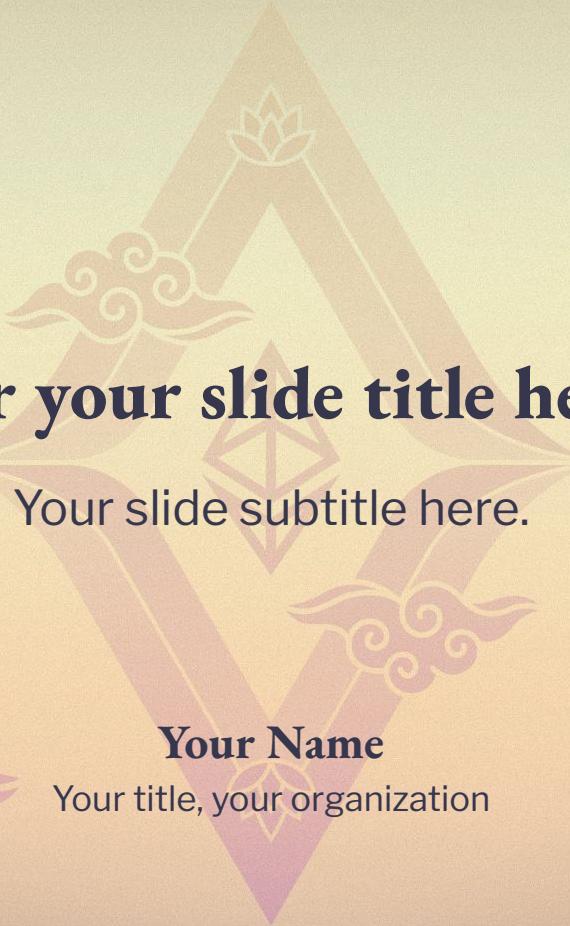
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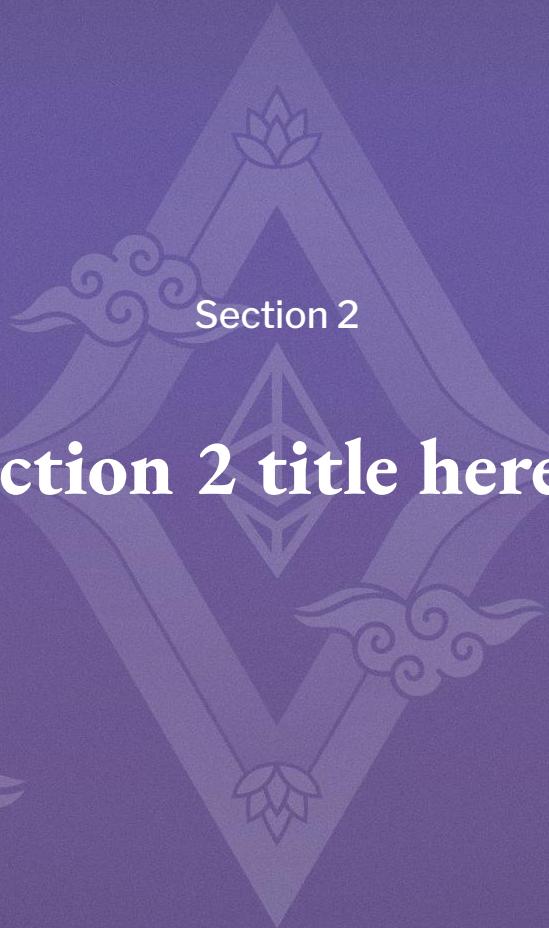
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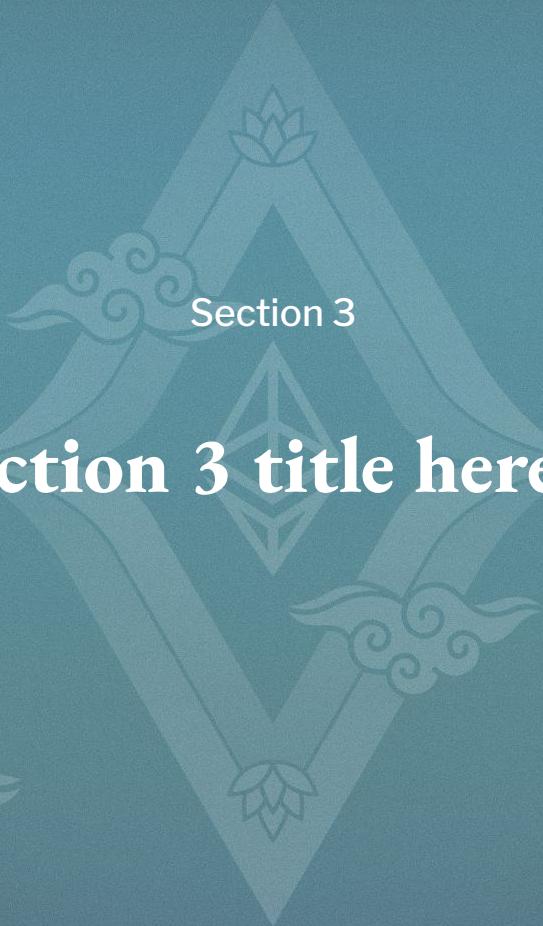




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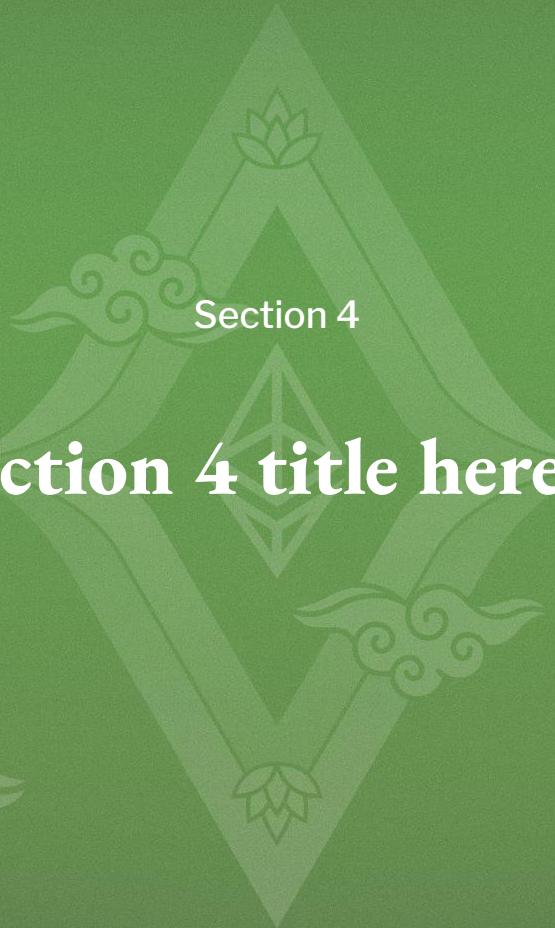
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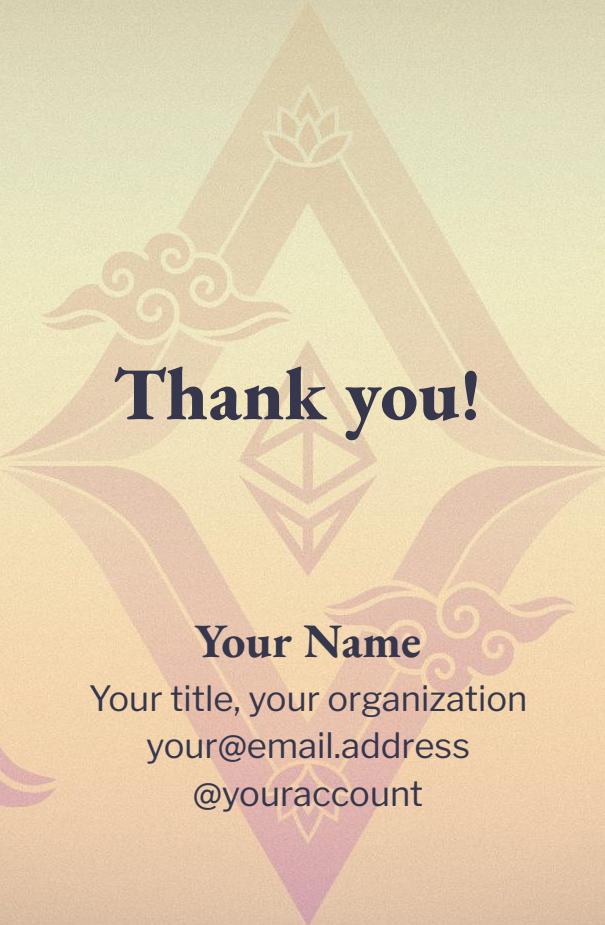


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“Number rules the universe.”

— Pythagoras





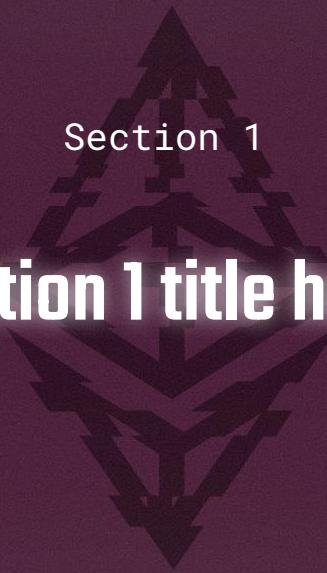


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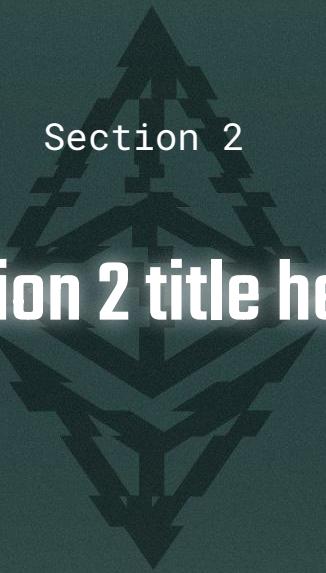
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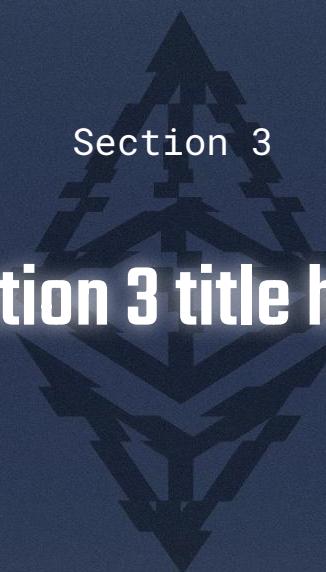
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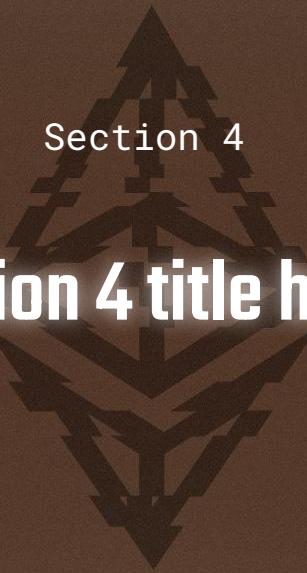
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Event 1



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