Disjoint Union Types in P0

Project 9 / Group 8

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What are Disjoint Union Types?

This is a text in the first frame. This is a text in the first frame. This is a text in the first frame.

How were they implemented?

Grammar Changes

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Grammar Changes

- Text visible on slide 1
- Text visible on slide 2

Grammar Changes

- Text visible on slide 1
- Text visible on slide 2
- Text visible on slide 3

Grammar Changes

- Text visible on slide 1
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- Text visible on slide 4

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Example: Maybe & Either

Example: Lists

Example: Strings

Remark

Sample text

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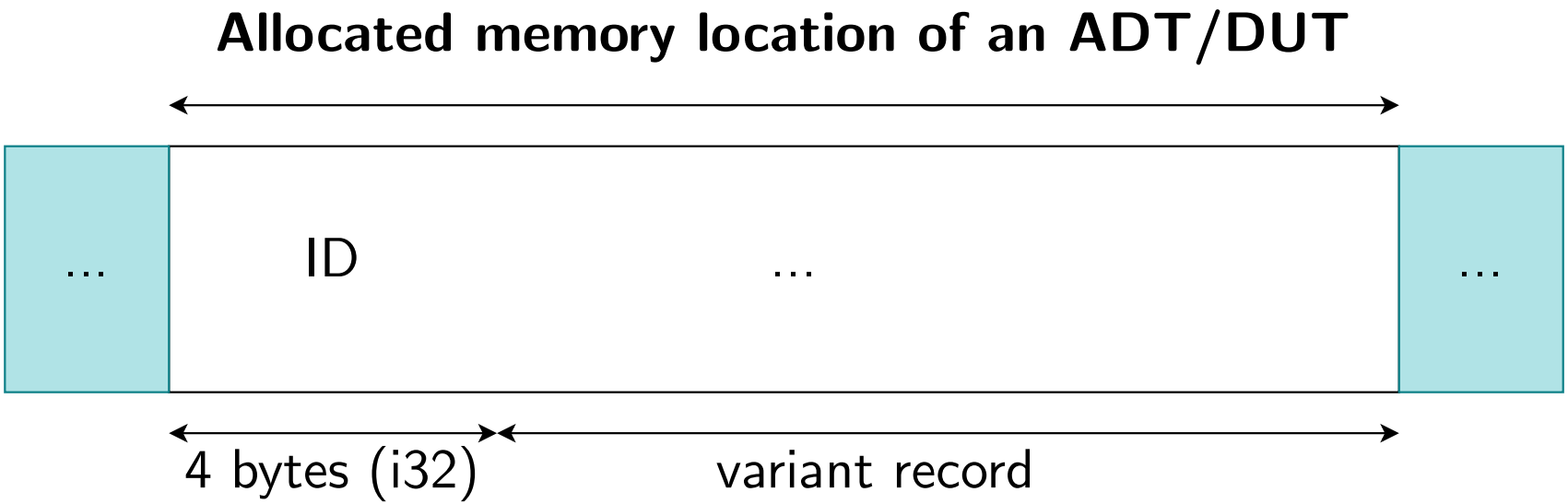
Memory Impact & Management

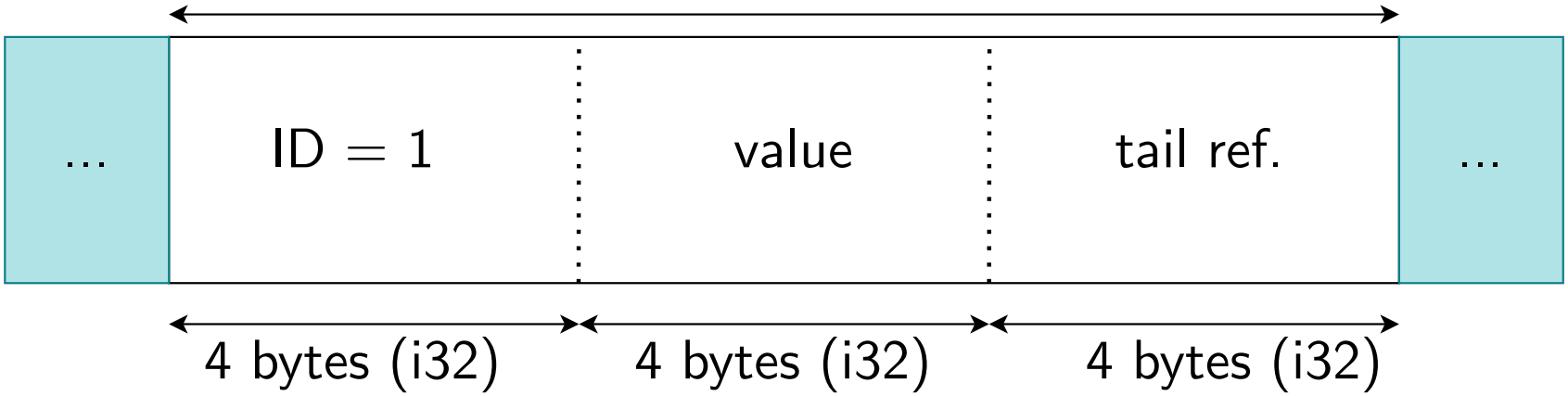
Each instance of a DUT is located on the heap, and instances of local/global DUTs are pointers to the locations of their corresponding DUT on the heap.

- Size of an allocation depends on the size of the variant being instantiated
- Offsets to accessing variables work similar to records, with a 4 byte offset for the variant id.

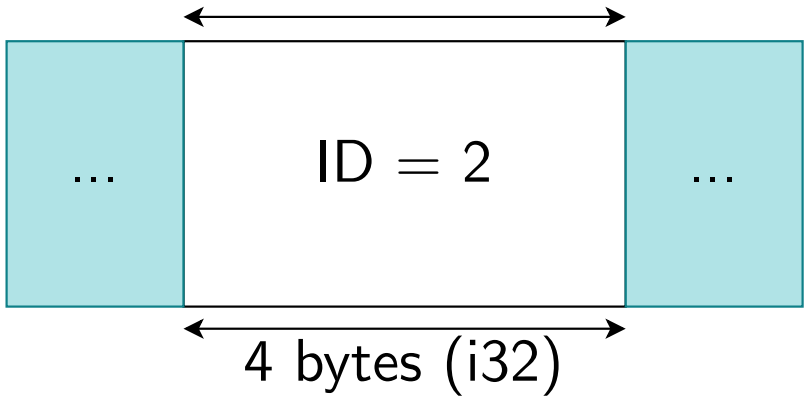


Example: Lists in Memory

Allocated memory location of a ‘Cons‘ (12 bytes)



Allocated memory location of a ‘Nil‘ (4 bytes)



Notable Design Decisions

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- This causes issues for **pywasm**
  - Due to being interpreted in Python, a recursive call stack size limitation is imposed onto our programs.
- Thankfully, **wasmer** has no issues!
- In-browser WebAssembly execution also has no issues, but we don't ship a web browser with the compiler.

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  - Strings, Lists, Maps as a basic set of built-in DUTs
  - Stronger syntactic sugar for String generation (e.g., “abcd...” for quickly instantiating large strings)
- Improved Memory Management
  - Memory freeing!
  - Memory reuse!
  - Allocation specialization for built-in DUTs!

References