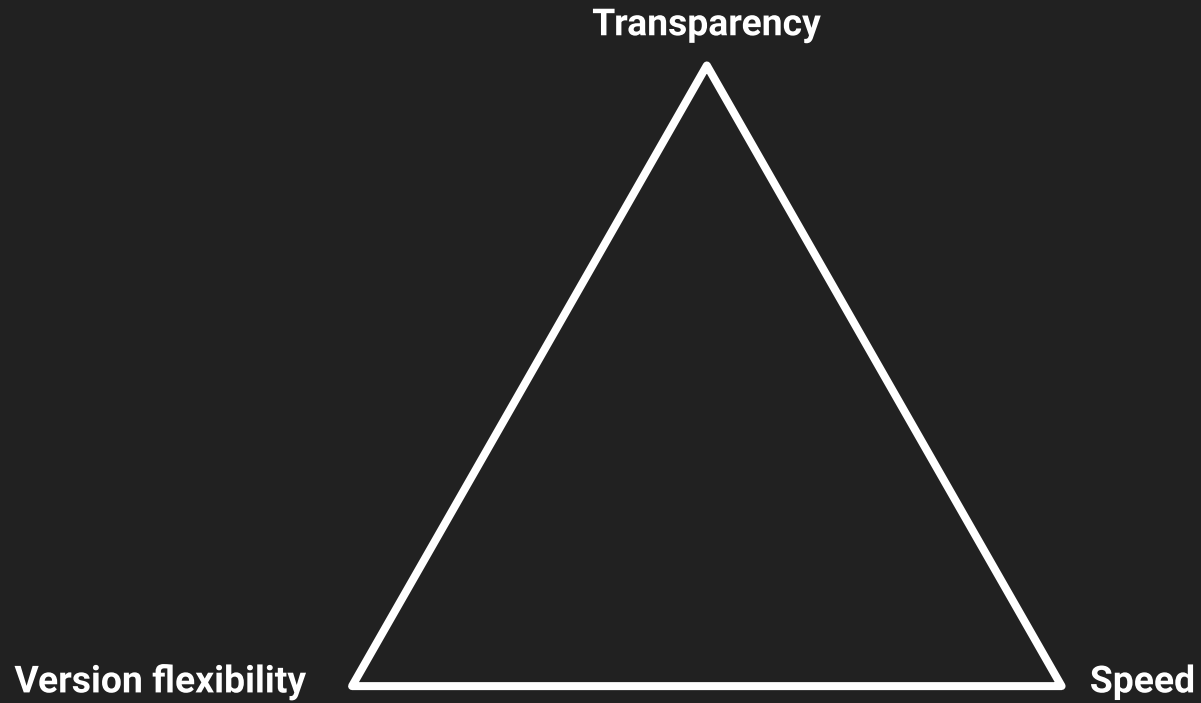
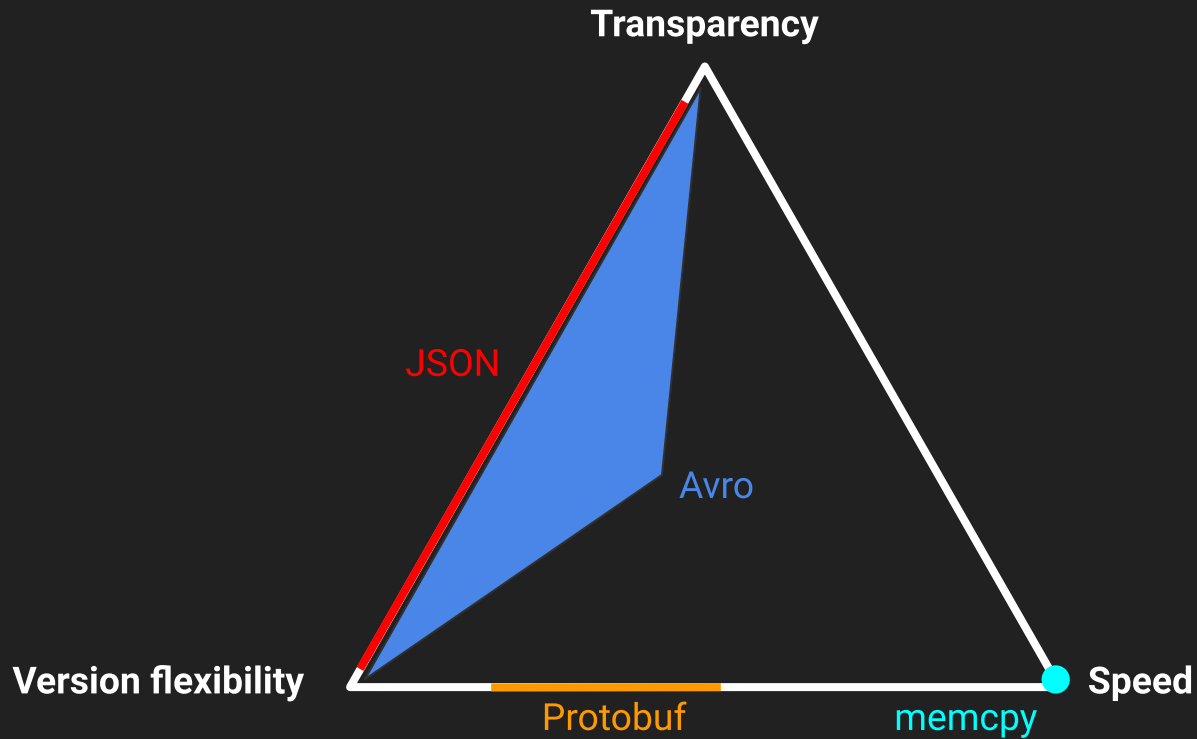


Protocol JIT

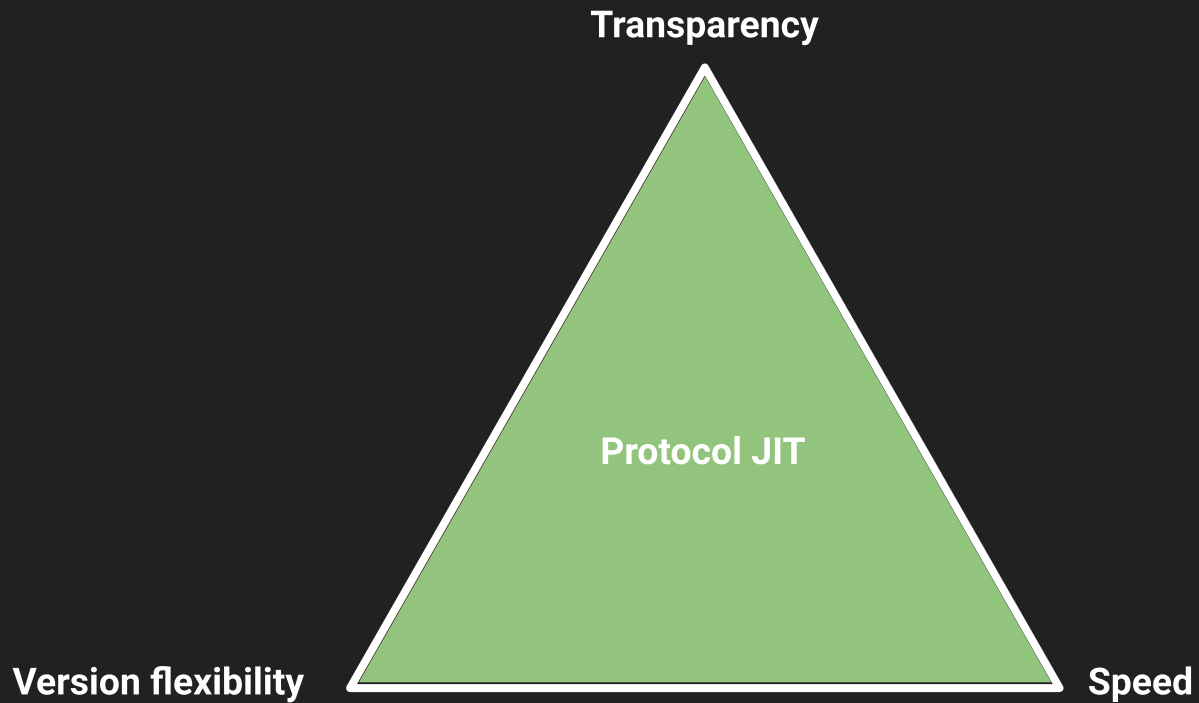
Motivation



Motivation



Motivation



Types

Integers

`intN | uintN | charN`

- Signed, unsigned and signless types with N bits
- Currently supports 8, 16, 32, and 64 bits

Types

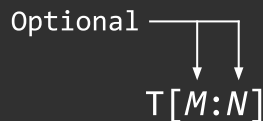
Arrays

$T[N]$

- Fixed length sequence of type T with exactly N elements

Types

Vectors




- Variable-sized sequence of type T with at most N elements, or no maximum if N is unspecified
- M is a hint to the compiler that it will rarely contain more than M elements

Types

Structs

```
struct S external {  
    field: T;  
    ...  
}
```

Optional




- Product type
- Generates a struct in C++ when compiled using **pjc**
- *external* indicates that the struct definition already exists and only supporting code is generated

Types

Variants

```
variant V {  
    term: T = N;  
    ...  
}
```



Optional

- Sum type
- Contains an *undef* term by default for decoding unknowns
- Generates the following struct in C++ when compiled with **pjc** (union entry omitted if T is not provided)


```
struct V {  
    enum class Kind { term = N, ... } tag;  
    union { T term, ... } value;  
};
```

Types

Enums

```
enum E {  
    term = N;  
    ...  
}
```

Optional



- Special case of variants with no data associated with terms
- Contains an *undef* term by default for decoding unknowns
- Generates the following output in C++ when compiled with **pjc**

```
enum class E {  
    term = N,  
    ...  
};
```

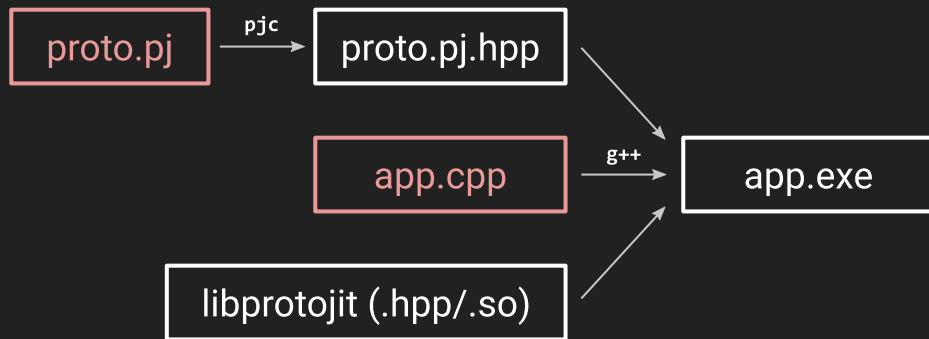
Types

Any

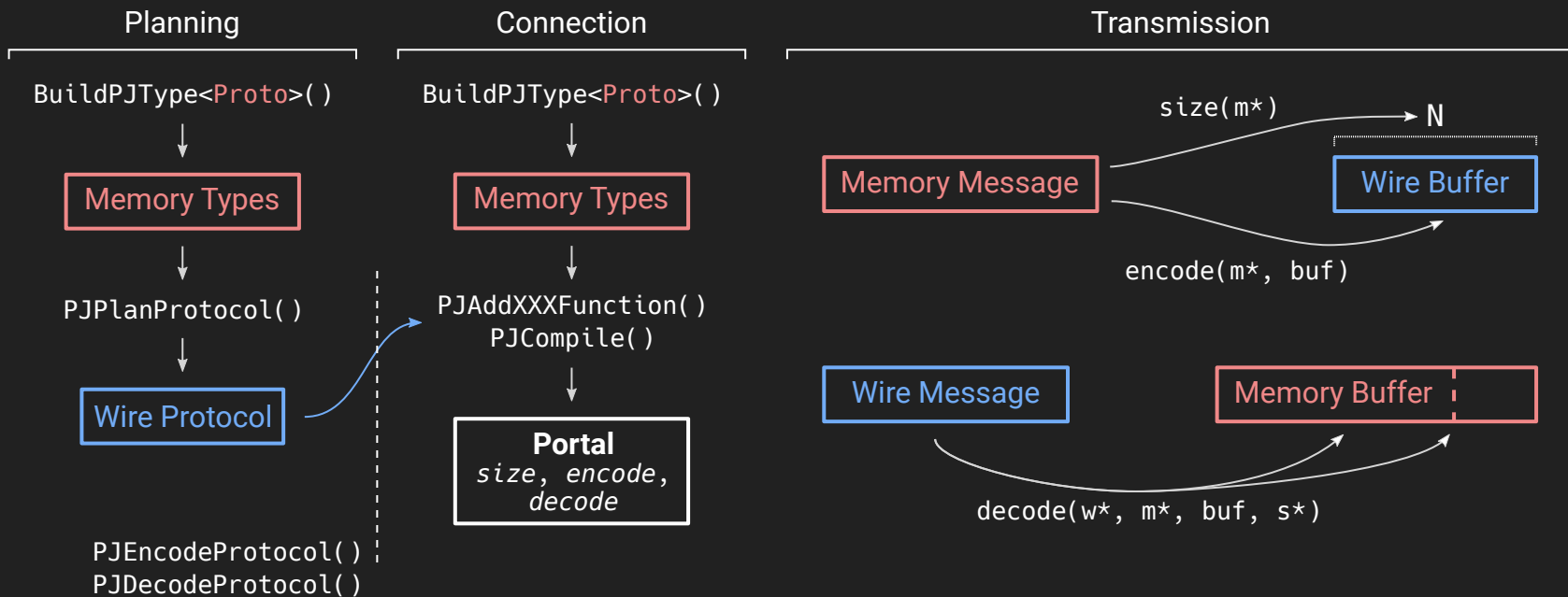
```
struct Message {  
  misc: Any;  
}
```

- Can be decoded but not encoded
- Any type can be decoded into **Any** without loss of information or type conversions applied.
- Instances of **pj::Any** expose a reflective API for accessing type and field/term/value information, akin to JSON

Compile Time



Runtime



Performance

| System | Latency ($\mu \pm \sigma$) | Difference |
|---------------------|------------------------------|------------------|
| TS-proto (baseline) | 1464.58 \pm 13.19 ns | 0 ns |
| TS-proto (volatile) | 1423.30 \pm 6.94 ns | -41.28 ns |
| Protocol JIT | 1390.12 \pm 10.03 ns | -74.46 ns |