

Title	: Provided by the Workshop
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Programmability

C++

Object - Oriented Programming Language

C++

Object - Oriented Programming Language

Mechanization

<PETE>

Portable Expression Template Engine

Diagram illustrating the Mechanization process, showing the Portable Expression Template Engine (PETE) and its associated tree structure.

<PETE>

Portable Expression Template Engine

Reduction
Semantics

Psi - Calculus

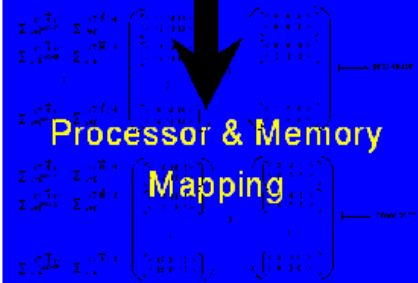
Generalized Array Indexing

A diagram on a blue background. At the top, the word "Performance" is written in large yellow font. A large black arrow points downwards from "Performance" to the text "Efficient Loops", which is also in yellow font. Below "Efficient Loops", there is a light blue speech bubble containing the text "Compile Time Loop Translation" in black font.

Efficient Loops

Compile Time
Loop
Translation

Processor & Memory Mapping



Operations

shift
take
rotate

Array.h

```
template<class T> inline
class Array
{
    ...
    template<class R> inline
    Array<R> operator<const L<Expression> R> &rhs>()
    {
        for (long i=0; i<this->size; i++)
            d[i] = lhs + rhs[i];
        return *this;
    }
    ...
private:
    T * d;
    vector<int> shape;
    long size;
}
```

```
template<class T = int>
class Matrix
{
    ...
    template<class KUNS>
    Array<Kopierer<const Expression<KUNS><KUNS>>>
    {
        for (long i=0; i<this->size; i++)
            d[i] = last such j (m, i) such that d[i] < 0, 0 < C.Combine(j);
        return "this"; //equivalent to: a.d[i] - b.d[i] + c.d[i] + d.d[i]
    }
};

private:
    T * d;
    vector<int> shape;
    long size;
```

```

graph TD
    A[Array.h] --- B(integrates with <PETE>)
    A --- C(Psi-Calculus platform)
    A --- D("N - dimensional capability  
( required for processor /  
memory mapping )")
  
```

Diagram illustrating the components and capabilities of **Array.h**:

- Array.h** integrates with **<PETE>**.
- Array.h** is part of the **Psi-Calculus platform**.
- Array.h** provides **N - dimensional capability** (required for processor / memory mapping).

integrates
with
<PETE>

Psi-Calculus
platform

N – dimensional capability
(required for processor /
memory mapping)

Array.h

Results : Comparable to Hand Coded C

Matrix Size	C++ (debug)	C++ (release)	PETE (debug)	C (debug)
0	~0.00	~0.00	~0.00	~0.00
1K	~0.05	~0.02	~0.03	~0.01
10K	~0.50	~0.15	~0.25	~0.10
100K	~2.50	~0.80	~1.00	~0.40
1M	~10.00	~3.00	~4.00	~1.50

Results : Comparable to Hand Coded C

