Using the Octave Core to Enhance the Computational Capabilities of an EPICS IOC

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What is Octave?

GNU Octave is a high-level language, primarily intended for numerical computations. It provides a convenient command line interface for solving linear and nonlinear problems numerically, and for performing other numerical experiments using a language that is mostly compatible with Matlab. It may also be used as a batch-oriented language.
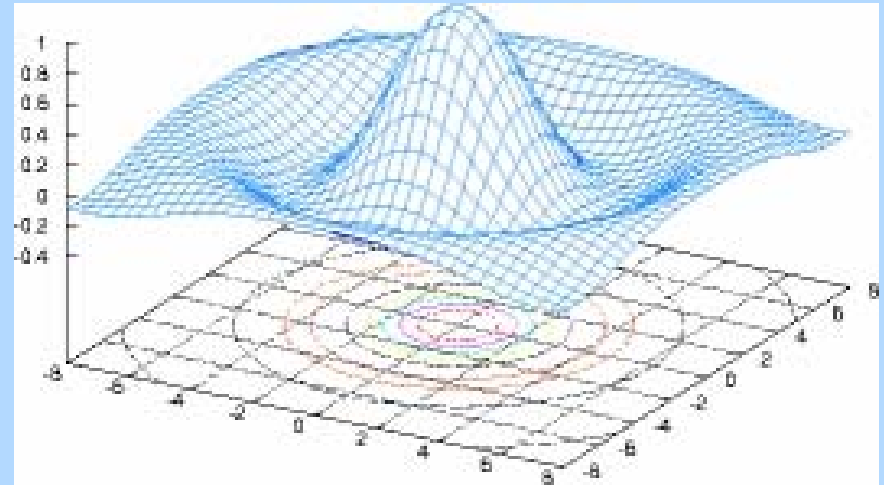
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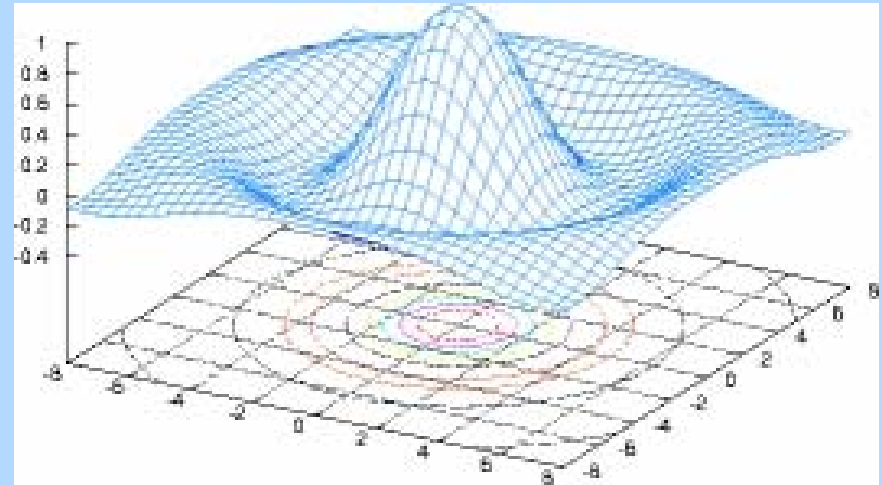
Creating a matrix

```
octave:1>
```

Creating a matrix

```
octave:1> A  = [ 1,1,2;3,5,8;13,21,34 ]
A =

    1    1    2
    3    5    8
   13   21   34

octave:2>
```

Some examples

Simple matrix arithemtic

```
octave:2> B = 2 * A
B =

    2    2    4
    6   10   16
   26   42   68

octave:3>
```
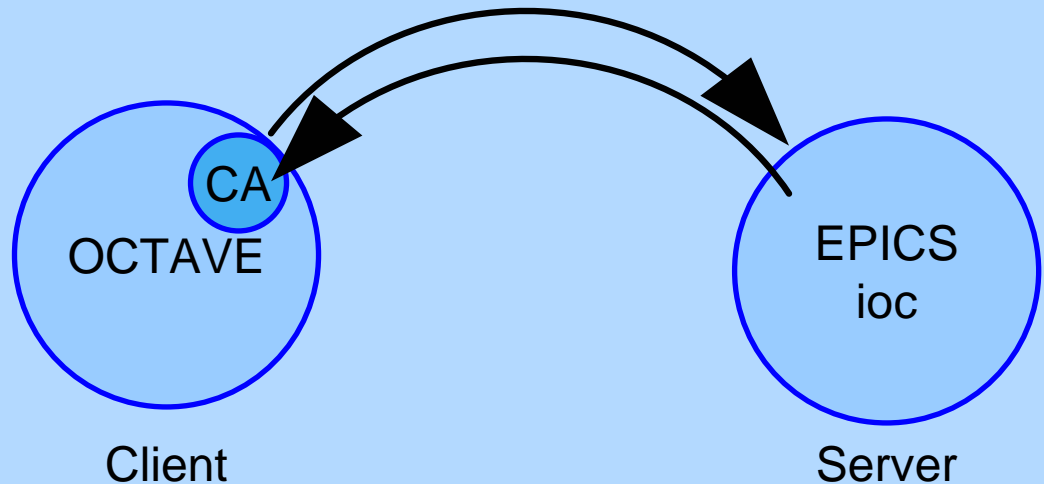
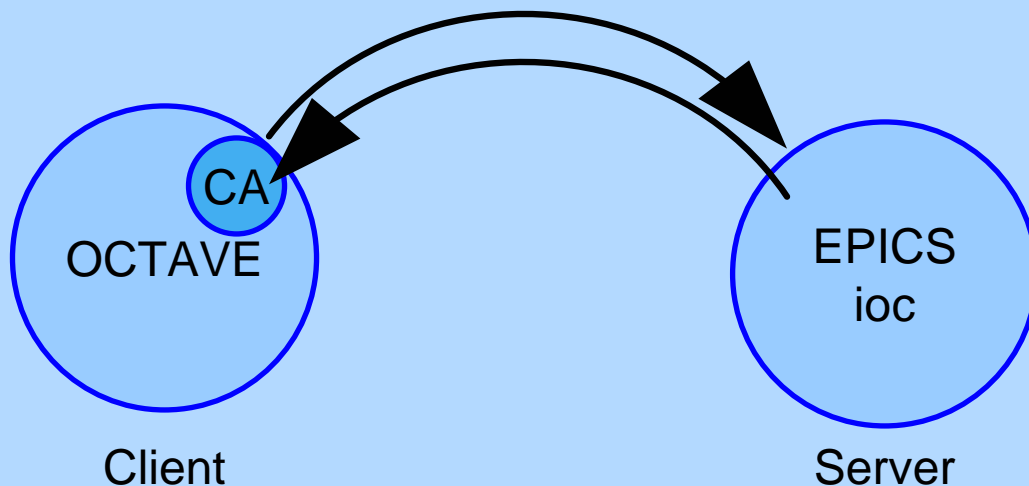# How EPICS interacts with Octave?

There are two approaches:

- Client oriented
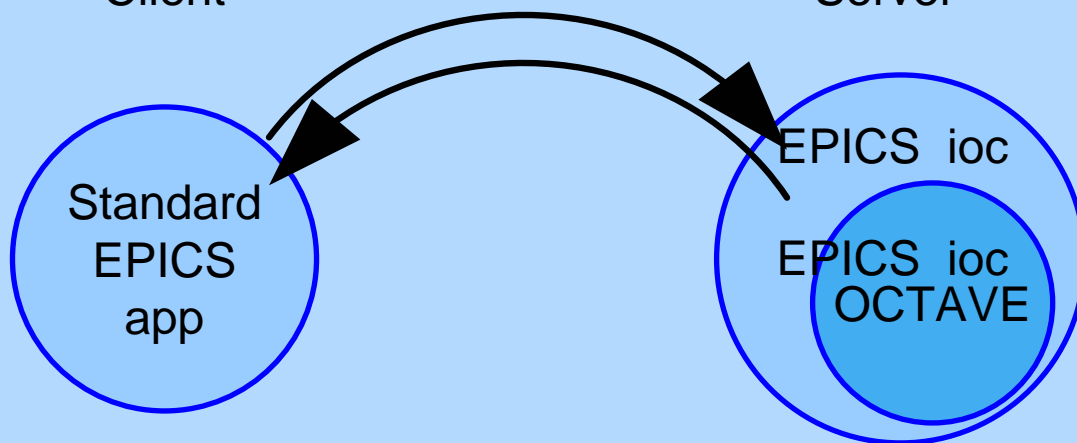
How EPICS interacts with Octave?

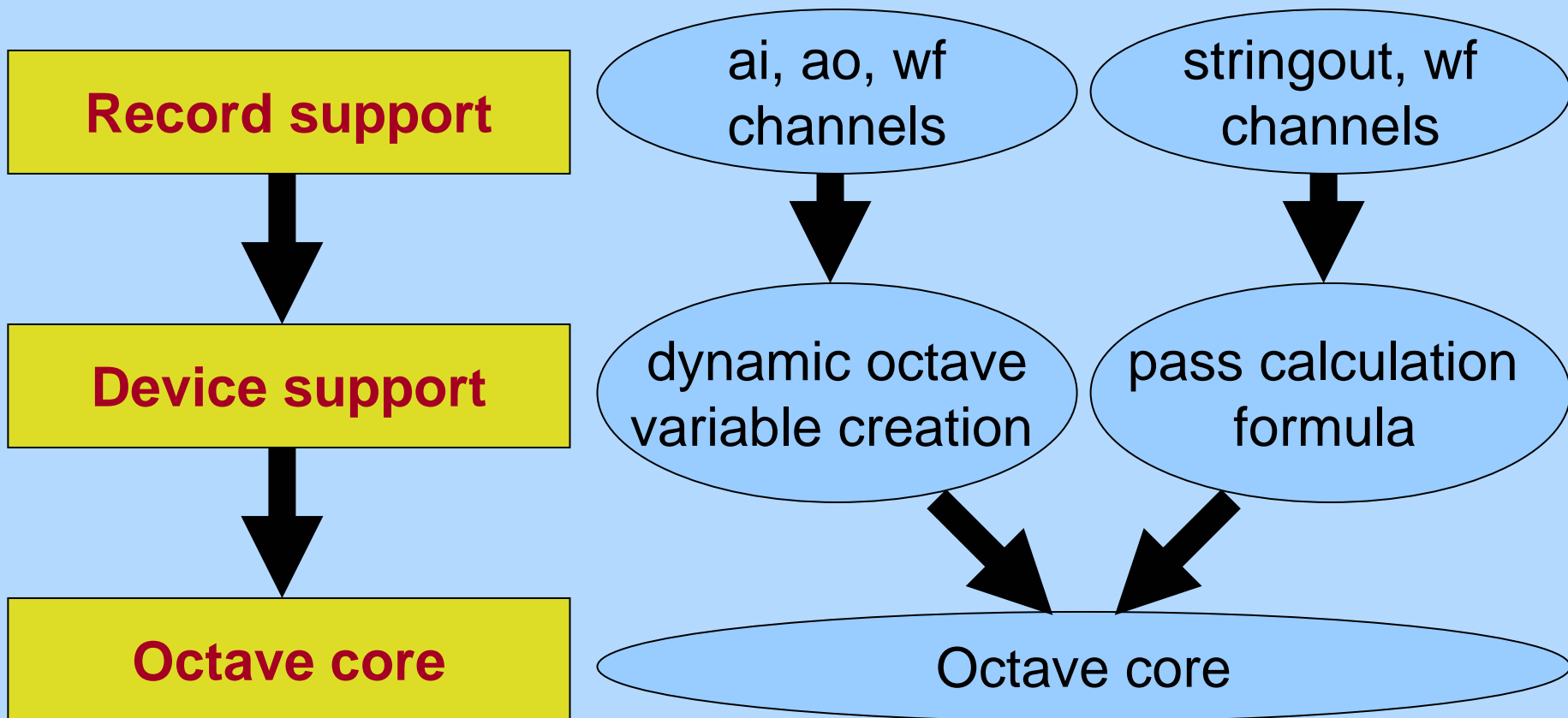There are two approaches:

- Client oriented

Client   Server

- Server oriented

Server oriented approach
for
Octave Epics ioc interaction

How EPICS talks to the embedded OCTAVE?

Passing data to a matrix

Client xterm

```
saturn>
```

Epics ioc-octave Server

Rec support — mywf:A

Dev support — Oct supp

Octave core

Passing data to a matrix

Client xterm

```
saturn> caput -m mywf:A 1,2,3,4
```

1,2,3,4

Rec support — mywf:A

Dev support — Oct supp

Octave core

A = [1,2;3,4]

Epics ioc-octave Server

Performing a calculation
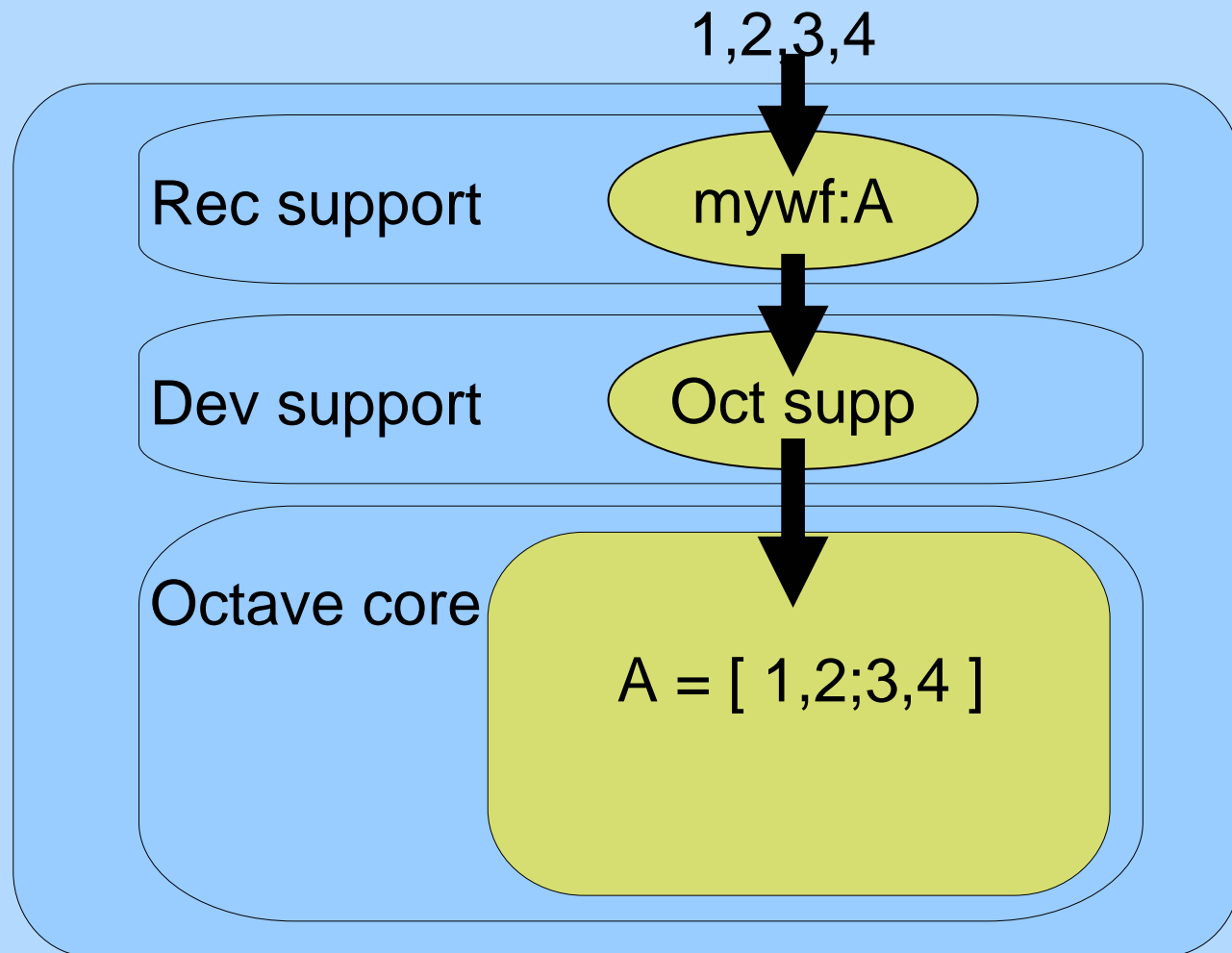
Client xterm

```
saturn>
```

Rec support   mystr:CALC

Dev support   Oct supp

Octave core

Epics ioc-octave Server

Performing a calculation

Client xterm

```
saturn> caput mystr:CALC "B=2*A"
```

B=2*A

Rec support   mystr:CALC

Dev support   Oct supp

Octave core
```
B =
    B =  2   2   *   A
             4
         6       8
```

**Epics ioc-octave
Server**

Obtaining data from a matrix

Client xterm

```
saturn>
```

Epics ioc-octave Server

Rec support — mywf:B

Dev support — Oct supp

Octave core

Client xterm

```
saturn> caget mywf:B
mywf:B 4 2 4 6 8
```

Rec support   mywf:B

Dev support   Oct supp

Octave core

$$B = \begin{matrix} 2 & 4 \\ 6 & 8 \end{matrix}$$

B = 2 4

Epics ioc-octave
Server

EPICS data base waveform out

EPICS data base waveform out

```
record(waveform,"mywf:A") {
 field(DESC,"wf out")
 field(NELM,"9")
 field(FTVL,"DOUBLE")
 field(DTYP,"OCTAVE")
 field(INP, "@A:OUT:ROWS=3")
}
```

EPICS data base waveform in

```
record(waveform,"mywf:B") {
 field(DESC,"wf inout")
 field(NELM,"9")
 field(FTVL,"DOUBLE")
 field(DTYP,"OCTAVE")
 field(INP, "@B:IN:ROWS=3")
}
```

EPICS data base waveform in

```
record(waveform,"mywf:B") {
 field(DESC,"wf inout")
 field(NELM,"9")
 field(FTVL,"DOUBLE")
 field(DTYP,"OCTAVE")
 field(INP,  "@B:IN:ROWS=3")
}
```

EPICS data base stringout

```
record(stringout,"mystr:CALC") {
 field(DESC,"calc formula")
 field(DTYP,"OCTAVE")
 field(OUT, "@")
}
```

The End