MDH — Examples

Important functions are MDHs — we can express them conveniently in our DSL:

Linear Algebra

```
GEMM = md_hom( *, (++, ++, +) ) o view( A,B )( i,j,k )( A[i,k], B[k,j] )
GEMV = md_hom( *, (++,     +) ) o view( A,B )( i,  k )( A[i,k], B[k]   )
DOT  = md_hom( *, (        +) ) o view( A,B )(     k )( A[k]  , B[k]   )
```

Stencil Computations

```
Gaussian_2D = md_hom( G_func, (++,++)     ) o view(…)
Jacobi_3D   = md_hom( J_func, (++,++, ++) ) o view(…)
```

Access <u>neighboring elements</u> within their input buffer

Data Mining

```
PRL = md_hom( weight, (++, ⊗max) ) o view(…)
```

Has <u>user–defined combine</u> operator that operates on <u>user–defined data type</u>

Machine Learning

Often very <u>high dimensional</u> (e.g., 7 dims)

```
TC = md_hom( *, (++,…,++ , +,…,+) ) o view(…)
```

Further examples: MLP, SVM, ECC, …, Mandelbrot, Parallel Reduction, …

Our DSL needs only two patterns:
md_hom(…) and view(…)