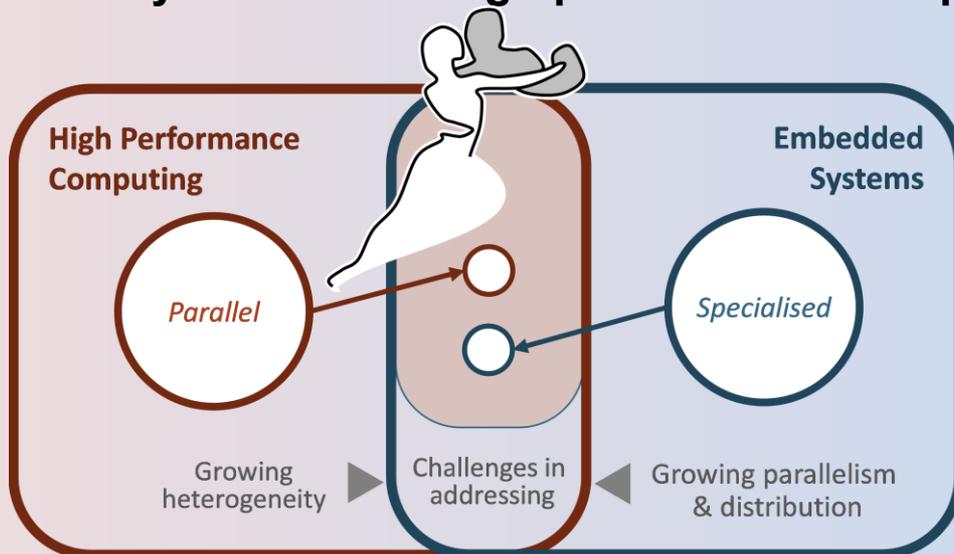




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## Embedded systems meet high performance computing:



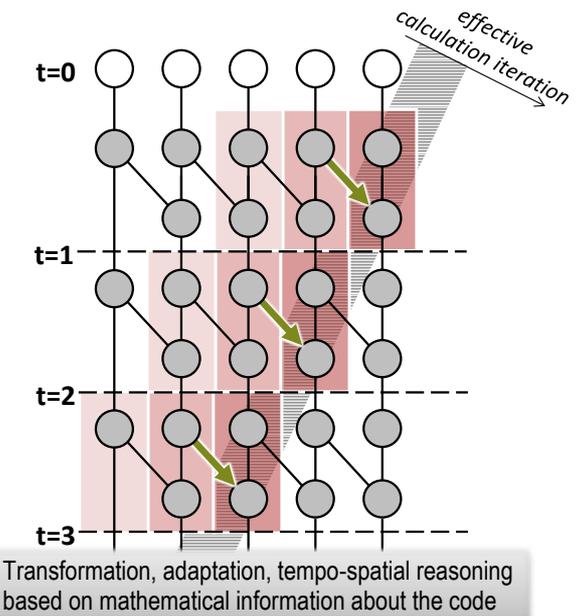
Toward a common programming model leveraging application's mathematical grounds

Programming

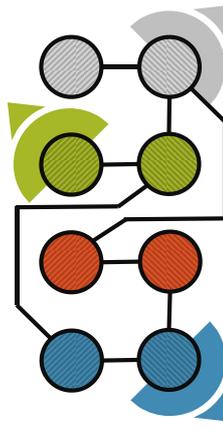
Large Scale  
Heterogeneous

Infrastructures

POLCA explicitly addresses the programmability concerns of both embedded and high performance computing. Both domains have generated strongly focused approaches for solving their specific problems that are now confronted with the increasing need to better address and exploit the parallelism in embedded systems and the heterogeneity in high performance computing. Rather than improving both domains separately, POLCA takes a bold step forward by proposing a hybrid programming model that decisively increases programming efficiency in both areas and enables realisation of multi-domain use cases.



optimal for GPUs  
e.g. vectorizable



optimal for FPGAs  
• e.g. streaming with multiple (identical) operations, but potential changes

Dealing with heterogeneity by code segmentation and mapping

optimal for DSPs

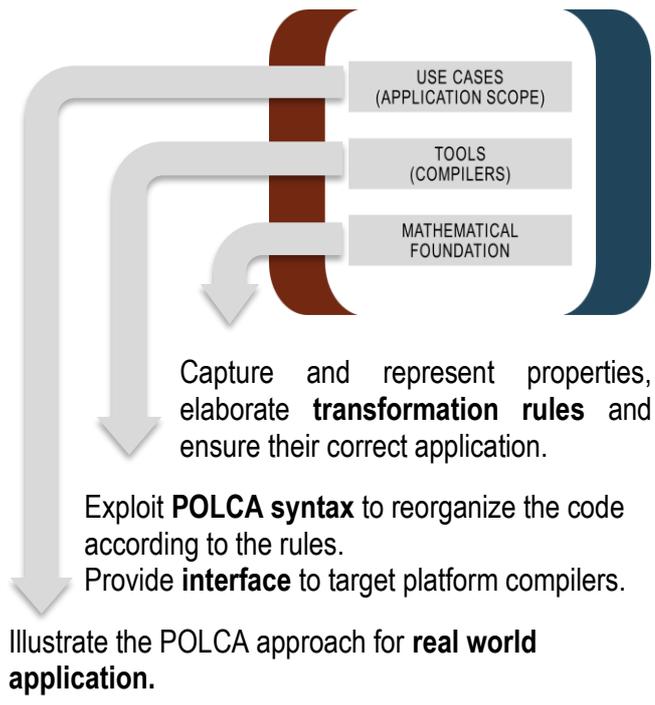
```
double heatmap[10];
double heatmap_tmp[10];

#pragma polca itn heatspread 100 heatmap:io
void main() {
    for (int iter=0; iter<100; iter++) { // 100 iterations
        heatspread(*heatmap);
        memcpy(heatmap, heatmap_tmp, 10);}

#pragma polca def(heatspread)
zipWith3 phi(heatmap[x-1]:i heatmap[x] heatmap[x+1])
void heatspread(double** heatmap) {
    for (int x=1; x<10-1; x++) {
        heatmap_tmp[x] = phi(heatmap[x-1], heatmap[x], heatmap[x+1]);
        ... }
}
```

Capturing the code properties using adequate annotations and allowing for their transformation by dedicated tools

**Objectives :** POLCA aims to provide



**Consortium**

- IOMI, University of Ulm (Coordinator)
- CAES, University of Twente
- HLRS, University of Stuttgart
- CETIC
- Fundación IMDEA Software and Universidad Politécnica de Madrid
- Maxeler Technologies
- Recore Systems

POLCA- Programming Large Scale Heterogeneous Infrastructures  
FP7-ICT-2013.3.4 (Project ref: 610686)

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