

Conjunctive Choice

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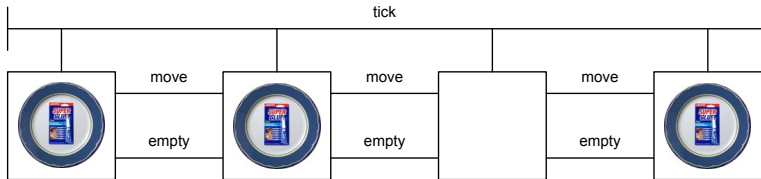
10 October 2008

Sticky Platelets example

Sticky Platelets example

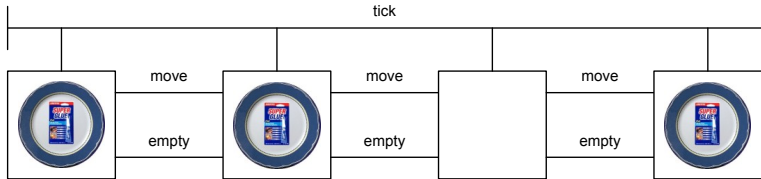


Sticky Platelets example



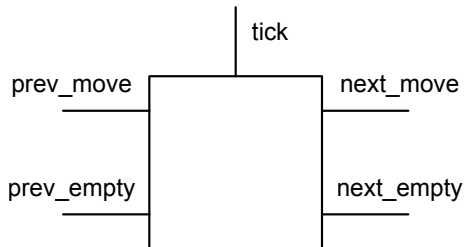
- 1-dimensional row of sites (space cells)
- A site is a process (platelet is not)
- Each site is either full or empty
- Discrete time-steps via tick event

Sticky Platelets example



- A platelet can move at most once per time-step
- A platelet can only move iff each neighbour is either:
 - Empty, or
 - Full but also moving
- Small chance (p) a given platelet will refuse to move during a time-step

Single Site



Site Header

```
process site(barrier prev_empty, barrier prev_move,
            barrier next_empty, barrier next_move,
            barrier tick, bool init_full)
{
    bool : full = init_full;
    while (true)
    {
        if (full)
        {
            ... full behaviour
        }
        else
        {
            ... empty behaviour
        }
    }
}
```

Empty Site Behaviour

Empty Site Behaviour

```
bool : done = false;
while (not done)
{
  alt
  {
    ...
    ...
    sync tick { done = true; }
  }
}
```

Empty Site Behaviour

```
bool : done = false;
while (not done)
{
  alt
  {
    ...
    sync next_empty { }
    sync tick { done = true; }
  }
}
```

Empty Site Behaviour

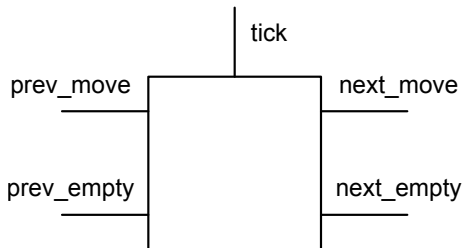
```
bool : done = false;
while (not done)
{
  alt
  {
    sync prev_move { full = true; }
    sync next_empty { }
    sync tick { done = true; }
  }
}
```

Full Site Behaviour

Full Site Behaviour

```
if (rand() <= p)
{
    sync tick;
}
else
{
    alt
    {
        ...
        ...
        sync tick {}
    }
}
```

Single Site

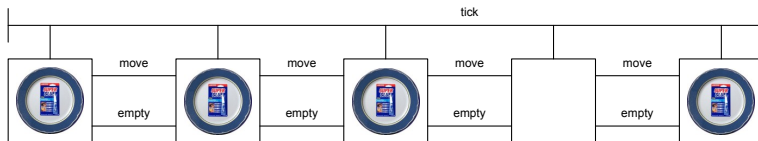


- A platelet can only move iff each neighbour is either:
 - Empty, or
 - **Full but also moving**

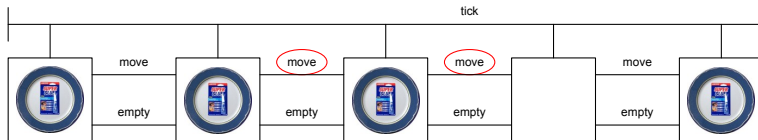
Full Site Behaviour

```
if (rand() <= p)
{
    sync tick;
}
else
{
    alt
    {
        ...
        sync prev_move & sync next_move
        { full = true; sync tick; }
        sync tick {}
    }
}
```

Event Fusing



Event Fusing



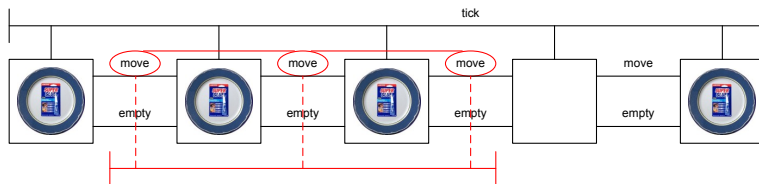
Event Fusing



Event Fusing



Event Fusing



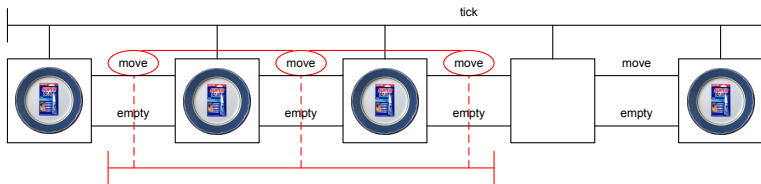
Full Site Behaviour

```
if (rand() <= p)
{
    sync tick;
}
else
{
    alt
    {
        ...
        sync prev_move & sync next_move
        { full = true; sync tick; }
        sync tick {}
    }
}
```

Full Site Behaviour

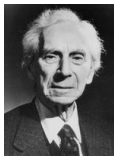
```
if (rand() <= p)
{
    sync tick;
}
else
{
    alt
    {
        sync prev_empty & sync next_move
        { full = false; sync tick; }
        sync prev_move & sync next_move
        { full = true; sync tick; }
        sync tick {}
    }
}
```

Event Fusing by Conjunction

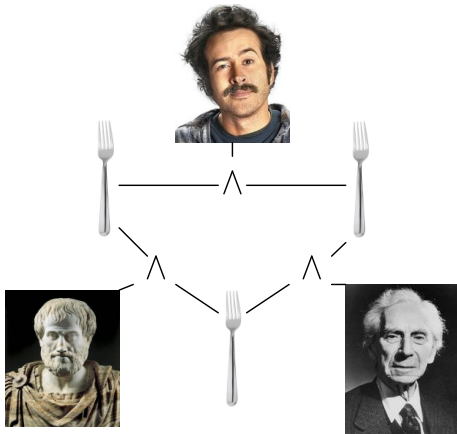


- Fuses several events into one dynamically
- Clot only moves together, without the need for extra processes
- Size n clot moves with $(1 - p)^n$ chance

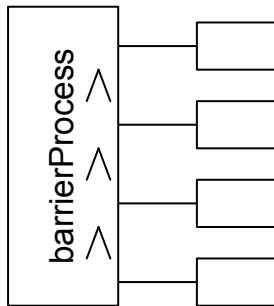
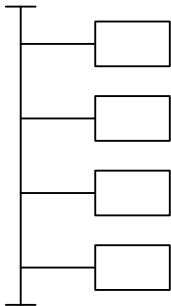
Dining Philosophers



Dining Philosophers



Barriers and Conjunction



Conclusions

- Conjunction allows for easier reasoning about some problems
- There is a mapping down to standard choice (but potentially exponential number of events)
- Working implementation in CHP (Haskell library), but not occam- π or JCSP (yet)
- Questions?