

# Komponentenprogrammierung & Middleware

## Ping

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# Agenda

- Technologies & Motivation
- Architecture
- Demo
- Challenges
- Discussion

# Technologies & Motivation

# Motivation

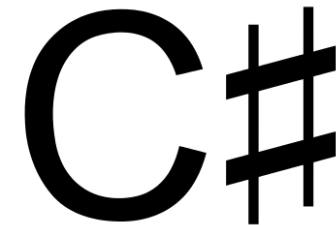
- Familiar with Python
  - Try out Python Remote Objects
- Interoperability of different languages
  - Combining statically typed and dynamically typed languages
- No CORBA

# Technologies

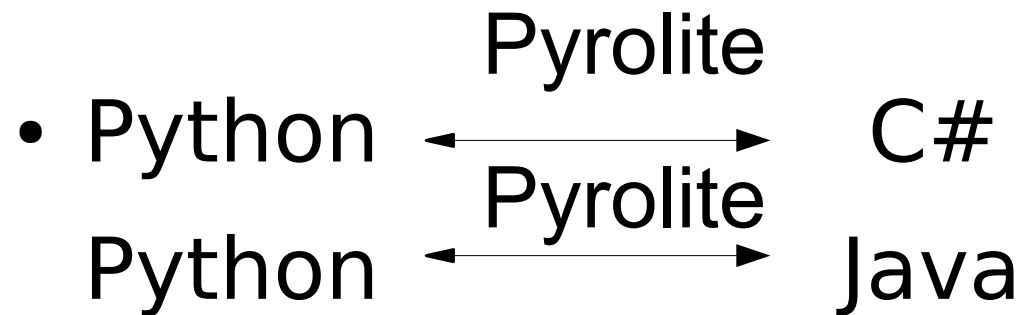
Frameworks:



Languages:



# 2 Choices



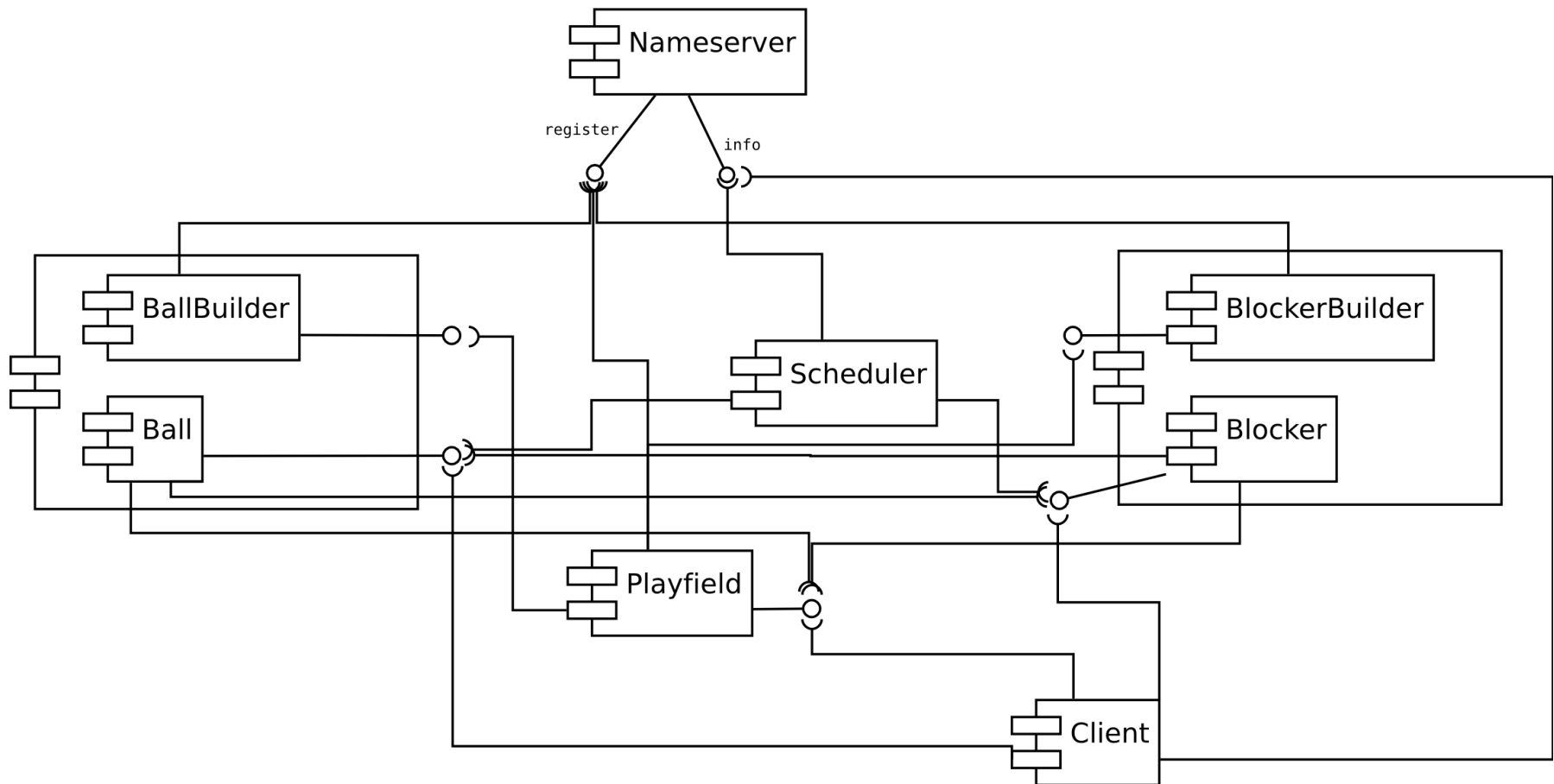
# Pyro

- Python, IronPython, Jython
- Calls on proxies
- Can host objects
- Futures
- Register in nameserver

# Pyrolite

- C#, Java
- Calls on proxies

# Architecture





# Demo

<https://github.com/niccokunzmann/ping>

# Challenges

# Synchronous/Asynchronous

```
private void update_balls()
{
    List<Object> proxies = (List<Object>)playfield.call("
foreach (PyroProxy ball in proxies)
{
    //synchronous: copy data
    balls.Add(Ball.FromPyroProxy(ball));
}
}
```

# Casts (Python)

```
def get_x(self):  
    return int(self.x)
```

# “Ugly Calls” (C#)

C# way:

```
playfield.getWidth();
```

What it actually looks like:

```
(int)playfield.call("get_width");
```

<http://stackoverflow.com/questions/24365101/generate-method-if-not-existent>

# “Ugly Calls” (C#)

- Solution DynamicObject:

```
public class PyroProxy : DynamicObject
{
    public override bool TryInvokeMember(InvokeMemberBinder
        binder, object[] args, out object result)
    {
        result = call(binder.Name, args);
        return true;
    }
}
```

```
dynamic playfield = new PyroProxy();
playfield.get_width(); //still not playfield.getWidt
```

# “Ugly Calls” (C#)

- Solution ExtensionMethods:

```
public static class ExtensionMethods
{
    public static int getWidth(this PyroProxy proxy,
        params object[] arguments)
    {
        return (int)proxy.call("get_width", arguments);
    }
}
```

```
dynamic playfield = new PyroProxy();
playfield.getWidth();
```

# URI Resolution

- Wrong IP address

pyro:obj\_98d3b51...ea1cac@192.168.0.101:  
4853

pyro:obj\_98d3b51...ea1cac@127.0.0.1:4853

Solution: explicit binding to one host



# Port Numbers Are Limited!

- “Only” 65535 ports
- 1 connection / Pyro proxy
- Many short lived proxies created constantly in double-dispatch between ball and block
- Framework assumes proxy reuse

# Port Numbers Are Limited!

```
Exception in thread "main" java.net.NoRouteToHostException: Cannot assign requested address  
    at java.net.PlainSocketImpl.socketConnect(Native Method)  
    [...]  
    at ping.Scheduler.main(Scheduler.java:27)
```

```
[Errno 10055] An operation on a socket could not be performed because the system lacks the  
sufficient buffer space or because a queue was full
```

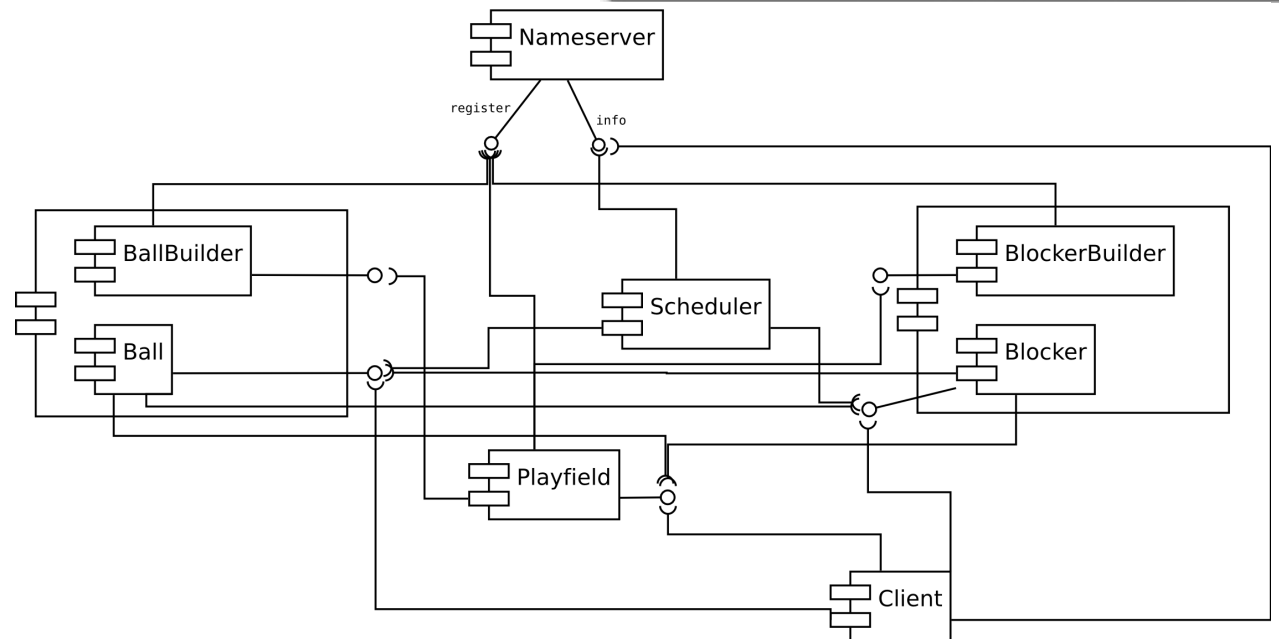
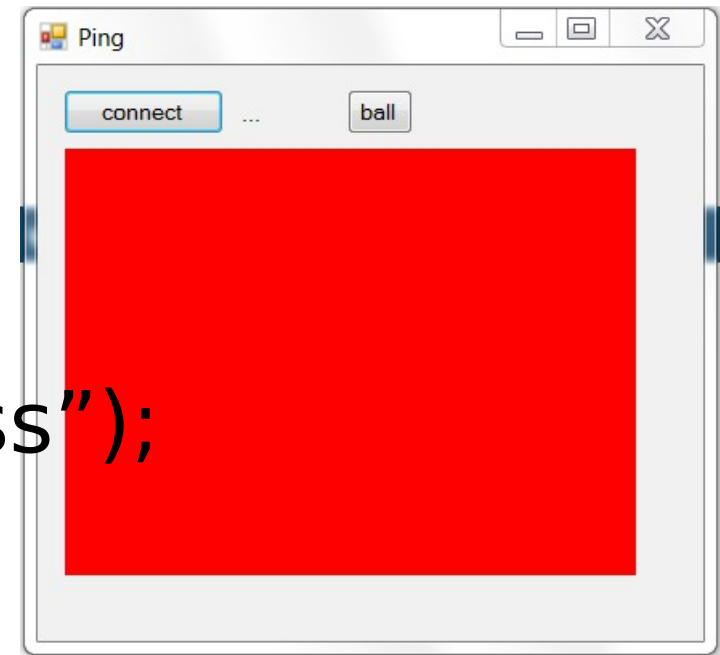
# Discussion

- Real World Context

```
student.call_oneway("discuss");
```



C#



# Sources

- [https://pythonhosted.org/Pyro4/\\_images/pyro-large.png](https://pythonhosted.org/Pyro4/_images/pyro-large.png)
- [http://en.wikipedia.org/wiki/.NET\\_Framework#mediaviewer/File:Microsoft\\_.NET\\_Framework\\_v4.5\\_logo.png](http://en.wikipedia.org/wiki/.NET_Framework#mediaviewer/File:Microsoft_.NET_Framework_v4.5_logo.png)
- [http://en.wikipedia.org/wiki/Java\\_\(programming\\_language\)#mediaviewer/File:Java\\_logo\\_and\\_wordmark.png](http://en.wikipedia.org/wiki/Java_(programming_language)#mediaviewer/File:Java_logo_and_wordmark.png)
- [http://en.wikipedia.org/wiki/C\\_Sharp\\_\(programming\\_language\)#mediaviewer/File:C\\_Sharp\\_wordmark.svg](http://en.wikipedia.org/wiki/C_Sharp_(programming_language)#mediaviewer/File:C_Sharp_wordmark.svg)
- [http://en.wikipedia.org/wiki/Python\\_\(programming\\_language\)#mediaviewer/File:Python\\_logo\\_and\\_wordmark.png](http://en.wikipedia.org/wiki/Python_(programming_language)#mediaviewer/File:Python_logo_and_wordmark.png)
- [http://stackoverflow.com/questions/24365101/c-sharp-generate-method-if-not-existent?noredirect=1#comment36141411\\_24365101](http://stackoverflow.com/questions/24365101/c-sharp-generate-method-if-not-existent?noredirect=1#comment36141411_24365101)