Programming with Kinect

the gloves are off

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What we'll cover

Natural User Interfaces

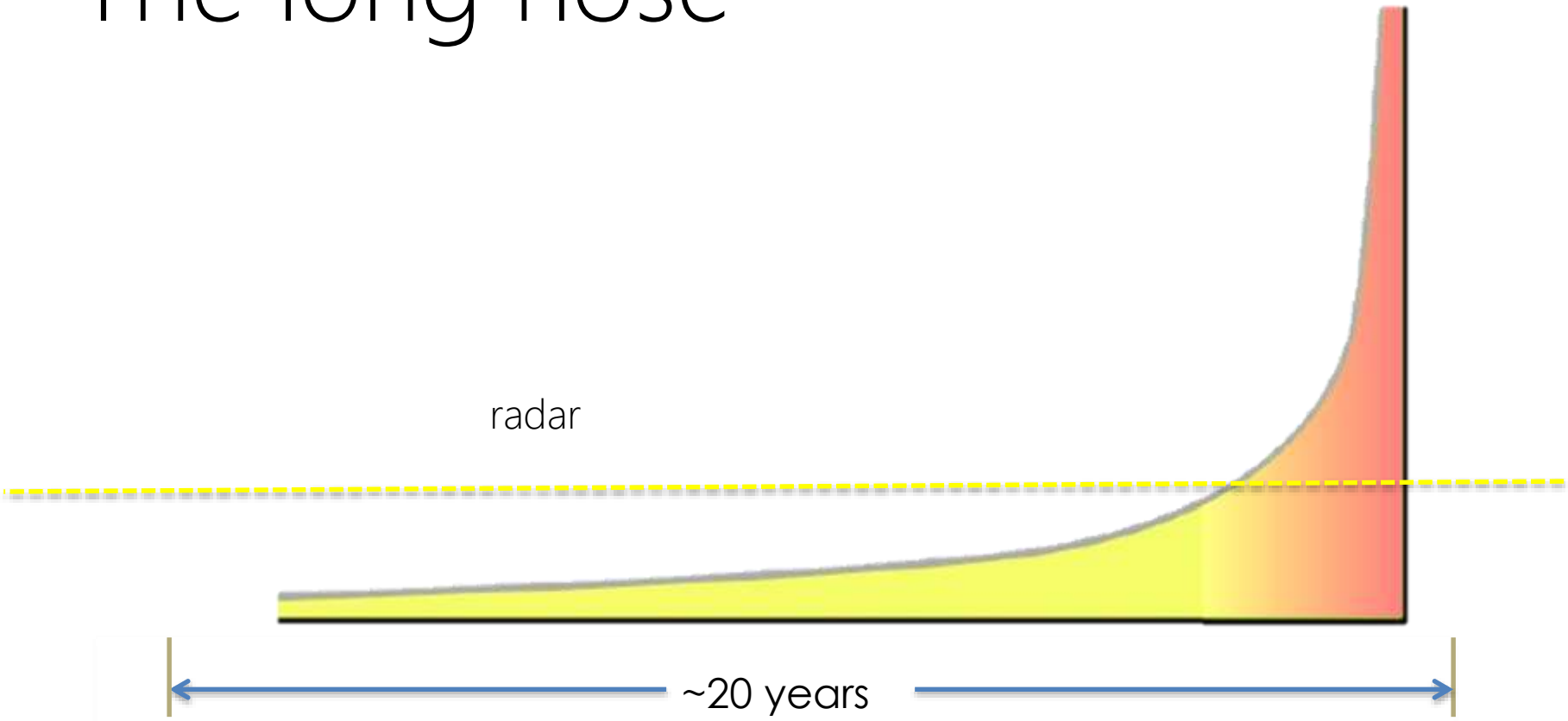
What is Kinect

Programming

World Wide Telescope

What's next

The long nose



Earlier examples of NUI

Non-gaming Examples

WHAT IS KINECT

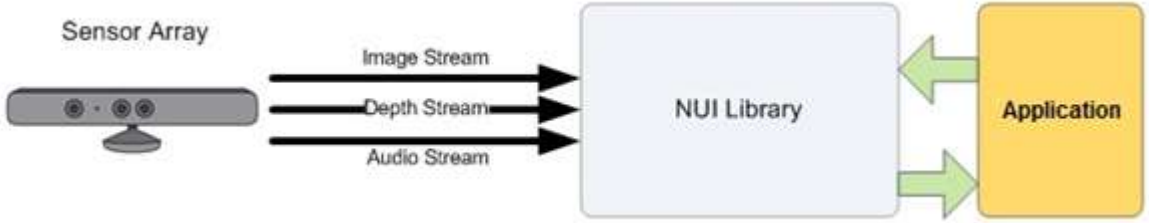

3D DEPTH SENSORS
RGB CAMERA
XBOX 360
KINECT
MULTI-ARRAY MIC
MOTORIZED TILT

Kinect for Windows SDK

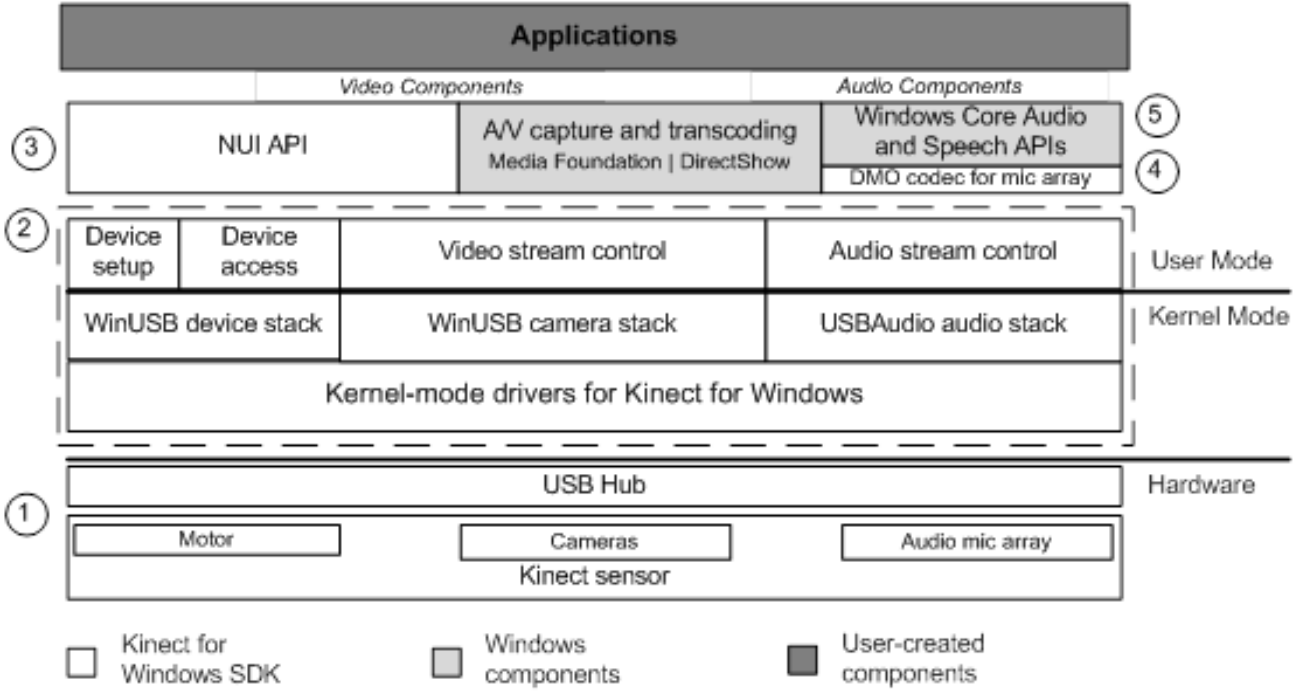
PROGRAMMING

Kinect for Windows architecture

- Sophisticated software library and tools
- Kinect-based natural input, sensing and reacts to real-world events.



SDK Architecture

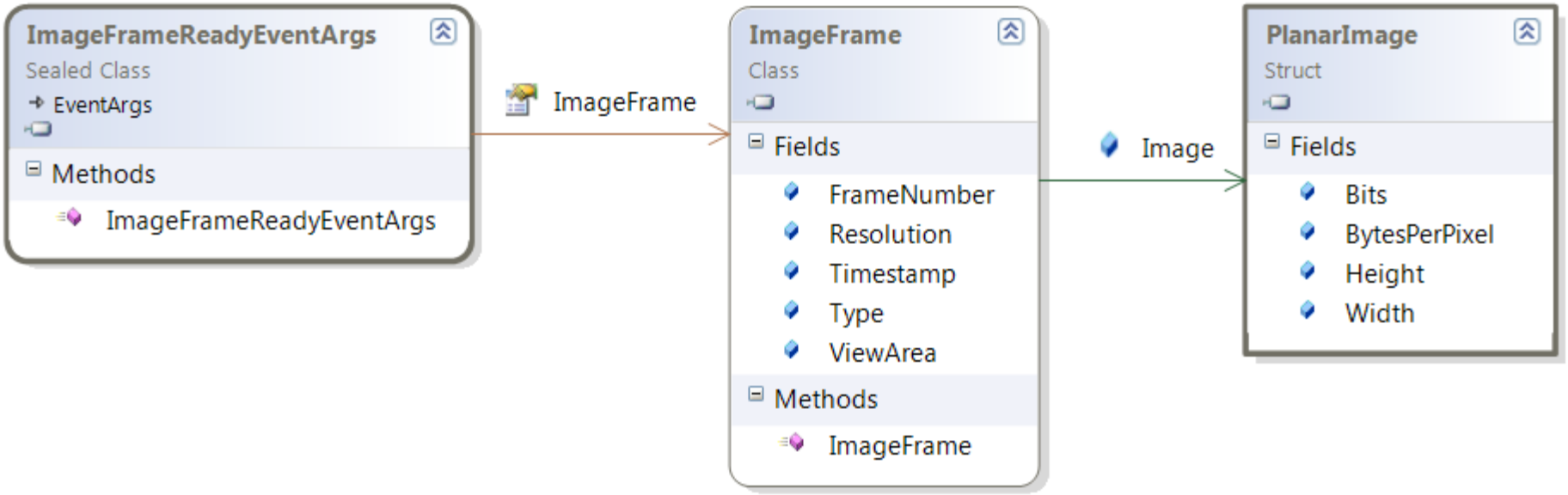


let’s play

PROGRAMMING WITH THE SDK

DISPLAYING DEPTH

Camera Data


ImageFrameReadyEventArgs
Sealed Class
EventArgs
Methods
ImageFrameReadyEventArgs
ImageFrame
ImageFrame
Class
Fields
FrameNumber
Resolution
Timestamp
Type
ViewArea
Methods
ImageFrame
Image
PlanarImage
Struct
Fields
Bits
BytesPerPixel
Height
Width

Depth Byte Buffer

- ImageFrame.Image.Bits
- Array of bytes `public byte[] Bits;`
- Array
  - Starts at top left of image
  - Moves left to right, then top to bottom
  - Represents distance for pixel

Calculating Distance

2 bytes per pixel (16 bits)

Depth – Distance per pixel

Bitshift **second byte by 8**

Distance (0,0) = `(int)(Bits[0] | Bits[1] << 8);`

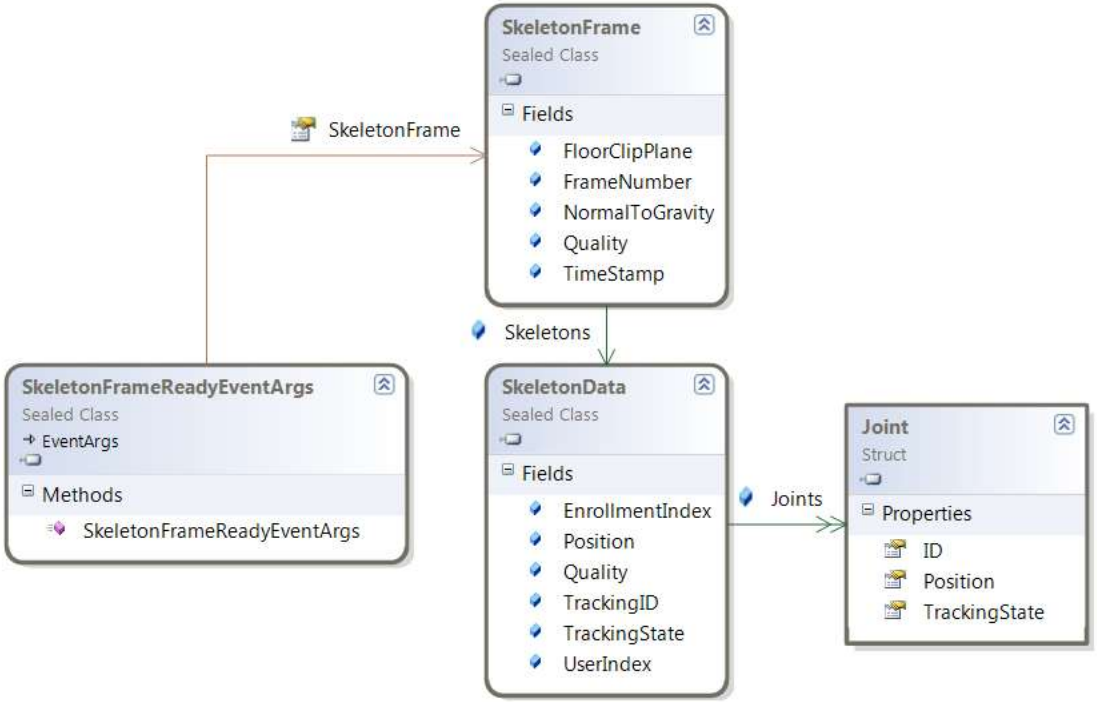
Depth Reference

- Distance Range: 850 mm to 4000 mm range
- Depth value 0 means unknown
  - Shadows, low reflectivity, and high reflectivity among the few reasons
- Player Index
  - 0 – No player
  - 1 – Skeleton 0
  - 2 – Skeleton 1

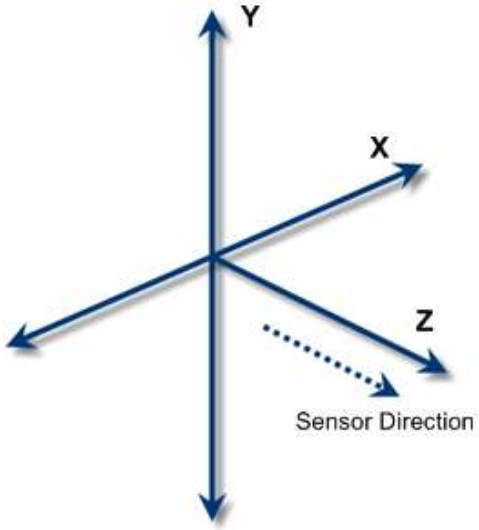
DEMO

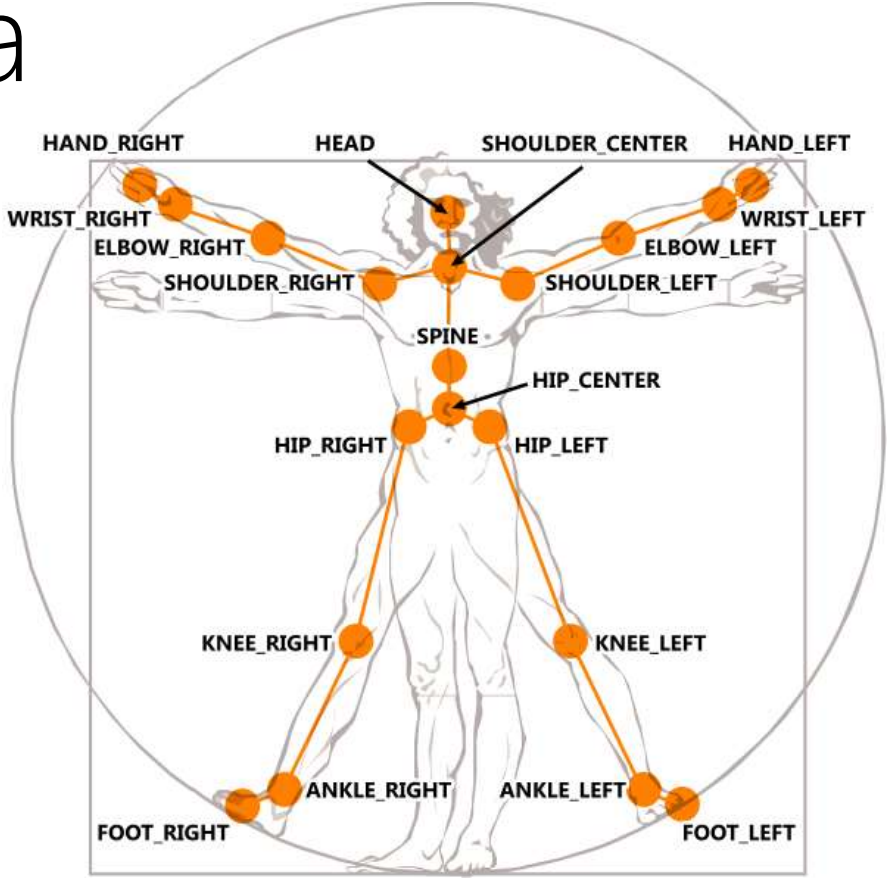
SKELETON TRACKING

Skeleton API



Skeleton Data





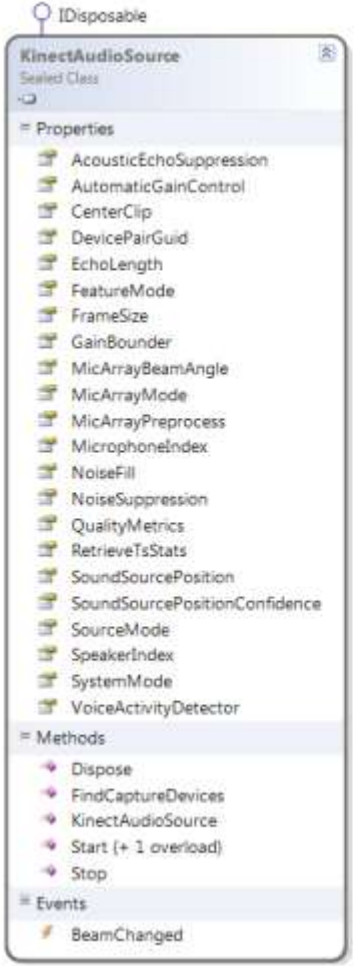
Joints

- Maximum two players tracked at once
- Each player with set of <x, y, z> joints in meters
- Each joint has associated state
  - Tracked, Not tracked, or Inferred
- Inferred - Occluded, clipped, or low confidence joints

DEMO

Audio Data

- Kinect as a microphone
- Kinect for Speech Recognition



Speech Recognition

- Grammar – What we are listening for
  - Code – GrammarBuilder, Choices
  - Speech Recognition Grammar Specification (SRGS)
    - C:\Program Files (x86)\Microsoft Speech Platform SDK\Samples\Sample Grammars\
- Note: Set AutomaticGainControl = false

Grammar

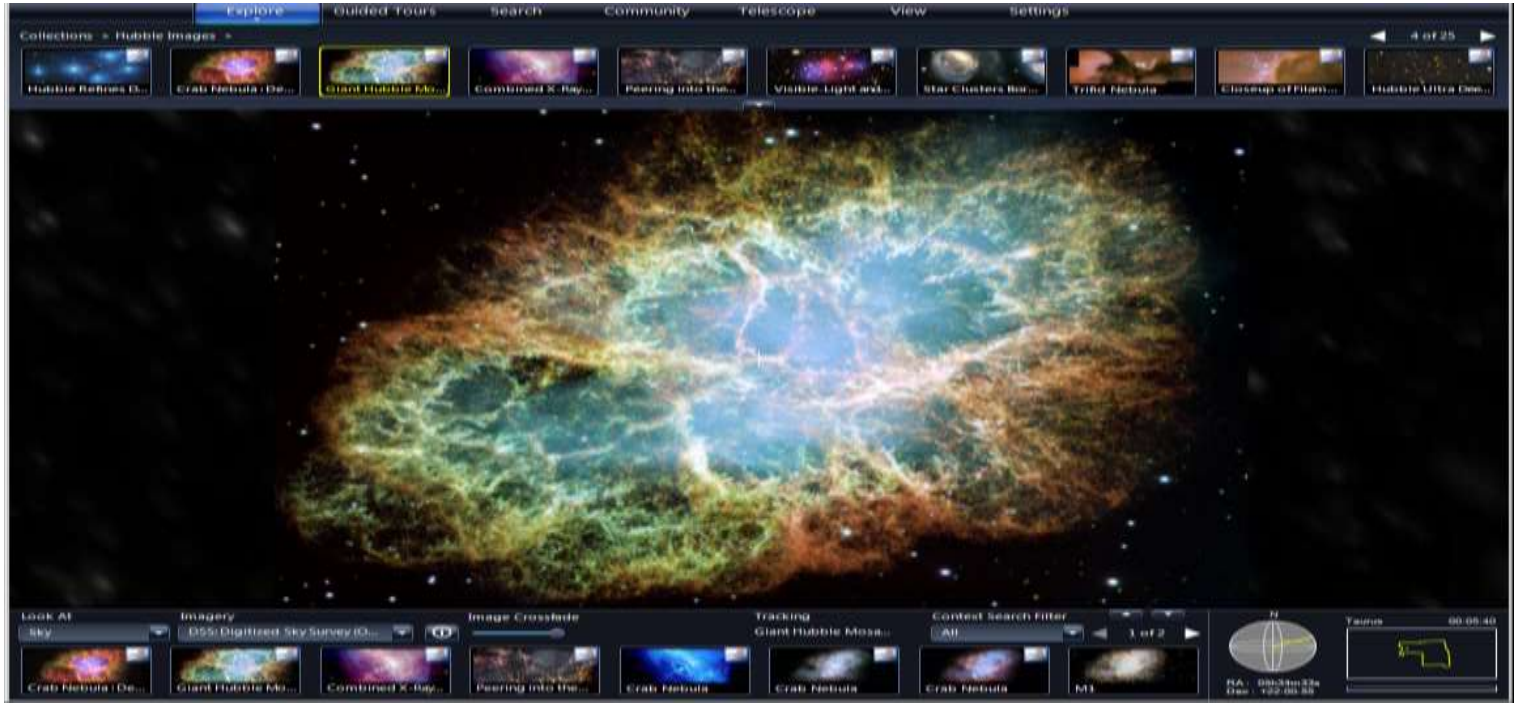
```
<!-- Confirmation_YesNo._value: string
["Yes", "No"] -->
<rule id="Confirmation_YesNo"
scope="public">
  <example> yes </example>
  <example> no </example>
  <one-of>
    <item>
      <ruleref uri="#Confirmation_Yes" />
    </item>
    <item>
      <ruleref uri="#Confirmation_No" />
    </item>
  </one-of>
  <tag> out = rules.latest() </tag>
</rule>
</rule>
```

```
<!-- Confirmation_Yes._value: string ["Yes"]
-->
<rule id="Confirmation_Yes" scope="public">
  <example> yes </example>
  <example> yes please </example>
  <one-of>
    <item> yes </item>
    <item> yeah </item>
    <item> yep </item>
    <item> ok </item>
  </one-of>
  <item repeat="0-1"> please </item>
  <tag> out._value = "Yes";</tag>
```

depth, skeleton, rotate earth, simple game, world wide telescope

MORE DEMO’S

World Wide Telescope



Information and follow up

WHAT’S NEXT?

Microsoft BizSpark™

Designed for software startups
Less than 3 years in business
Less than 15 employees
Development tools + support
Cloud
www.microsoft.com/bizspark
@markvoer

Kinect Accelerator Project

- 10 tech-oriented companies
- Mentoring by Kinect team
- Connection to key industry players (including investors)
- Accepted now through January 25th, 2012

Kinect Camp

- 16 Januari 2012
- Georganiseerd door AIM/GITC
- Bij Microsoft Nederland
- Informatie: Roger ter Heide
  mailto:roger@amersfoortcreatievestad.nl

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Resources

- Download
  - http://research.microsoft.com/kinectsdk
- Kinect Programming Walkthroughs
  - http://research.microsoft.com/kinectsdk/
- Coding4Fun Kinect Toolkit
  - http://c4fkinect.codeplex.com
- Kinect SDK Quickstarts
  - http://channel9.msdn.com/series/KinectSDKQuickstarts

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