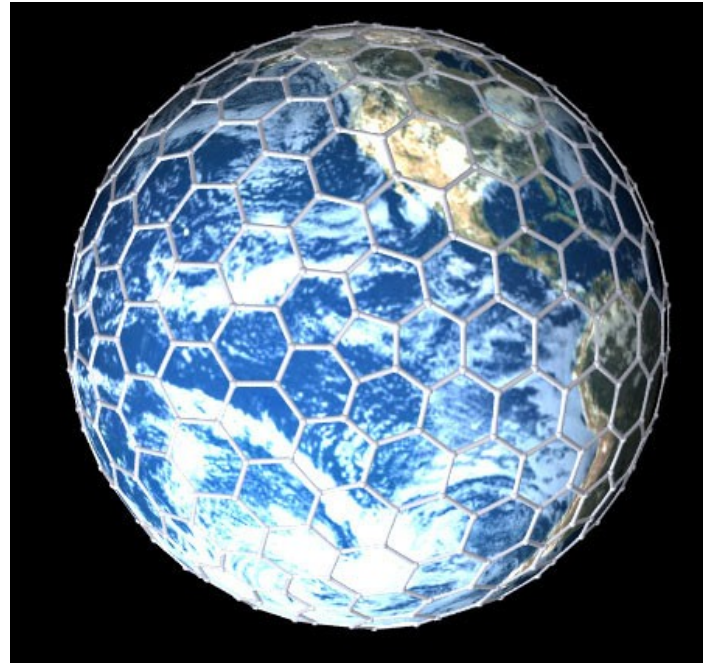


Connecting the Dots



by Kirby Urner, 4D Solutions,
Summer of 2007



EuroPython 2007
9-11 July, 2007,
Vilnius, Lithuania



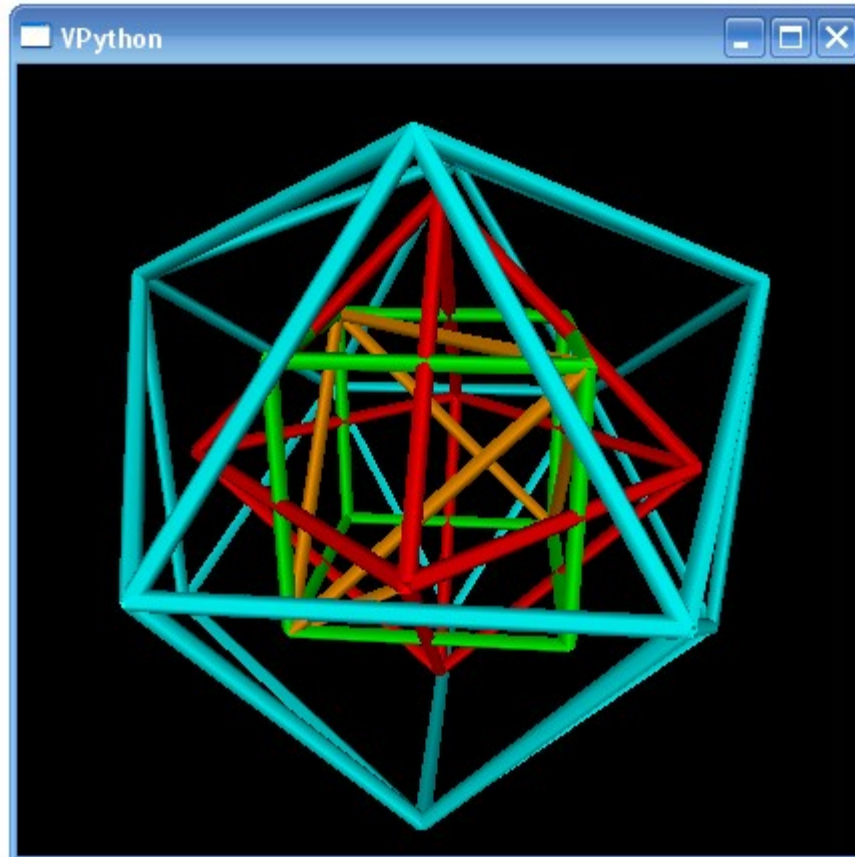
What is P4E?

Rails Under the Knife <i>Jacob Harris</i>	Python 3000 <i>Guido van Rossum</i>	Body Hacking <i>Quinn Norton</i>
Practical Considerations for Domain Specific Languages in Ruby <i>Muness Alrubaie</i>	Programming for Everybody: CP4E <i>Kirby Umer</i>	Keeping Your Workers In Line: Use TheSchwartz <i>Brad Whitaker, Lisa Phillips</i>

oscon 2007

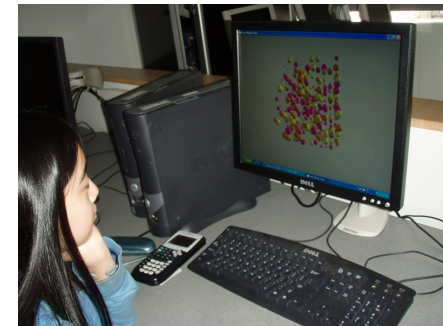
P4E in Portland, Oregon circa 2007

```
IDLE 1.2.1  
>>> import polyhedra  
>>> polyhedra.test()  
>>>
```



3D Programming for
Ordinary Mortals

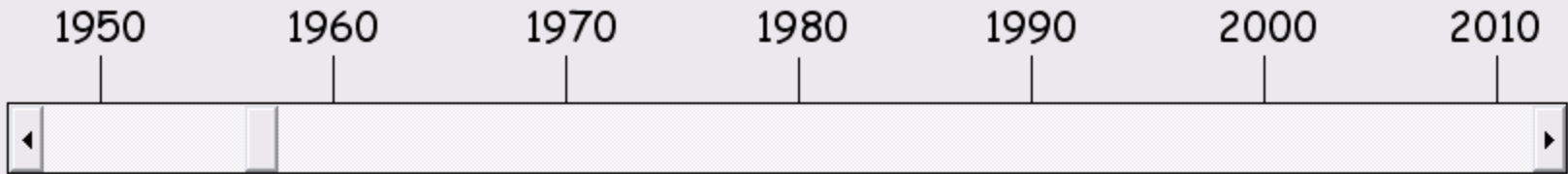
HOME DOWNLOADS DOCUMENTATION



Programming for Everybody (P4E)

- Guido, IDLE and the .mil sector (CP4E)
- Add-ons from the .edu sector (e.g. VPython)
- Edu-sig archive at Python.org
- M. Shuttleworth matrix (kusasa.org etc.)
- A. Kay matrix (Dynabook, OLPC etc.)
- K. Urner matrix (HP4E etc.)
- A. Siegel matrix (Pygeo etc.)
- ... and so on (every “gnu math teacher” gets a “matrix” and applies a “spin” – KU’s namespace)

OK, so who am I then?



START: Chicago;

MOVE: Portland;

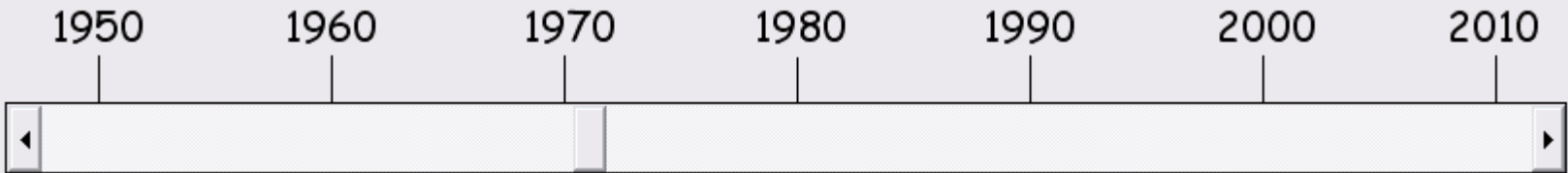
MOVE: Rome;

MOVE: Florida;

MOVE: Philippines;

MOVE: Princeton... (lots of MOVES)





Son of AFSC work camp leaders in Mideast (Fischer vs. Spassky), *Asia-Pacific Issues News* (writer, editor), clerk of AFSC youth program (LAAP), NPYM delegate to AFSC

AFSC = American Friends Service Committee, Nobel Peace Prize 1947, NPYM = North Pacific Yearly Meeting



**American Friends
Service Committee**

Quaker values in action



1950

1960

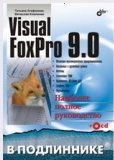
1970

1980

1990

2000

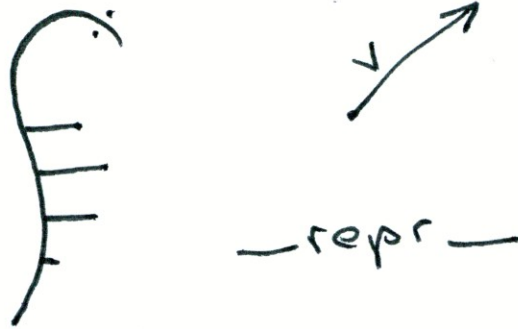
2010



Looking back: St. Dominic Academy (Jersey City, 1981), Americans for Civic Participation (Wash. DC), McGraw-Hill (New York City, 1984); Center for Urban Education (PDX); BFI webmaster; 1st International Conference on Bucky Balls (Santa Barbara, 1993); GENI Centennial (1995); Parliament of World Religions (Cape Town, 1999), xBase programmer (dBase then FoxPro), student of Python (starting Python 1.x).

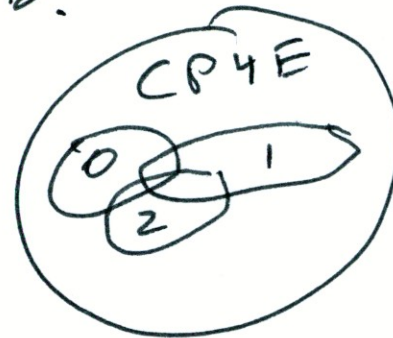
We'll get back to me later...

A.



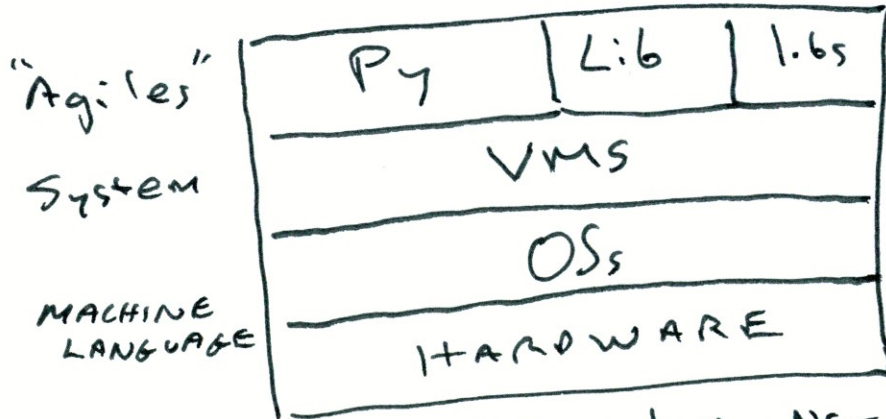
"pythonic vector"

B.



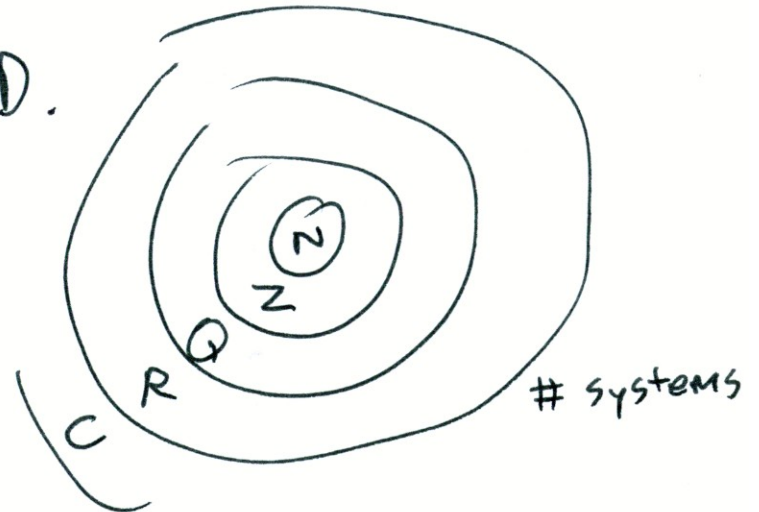
0 = Python
 1 = other languages
 2 = OLP
 = one laptop per child

C.



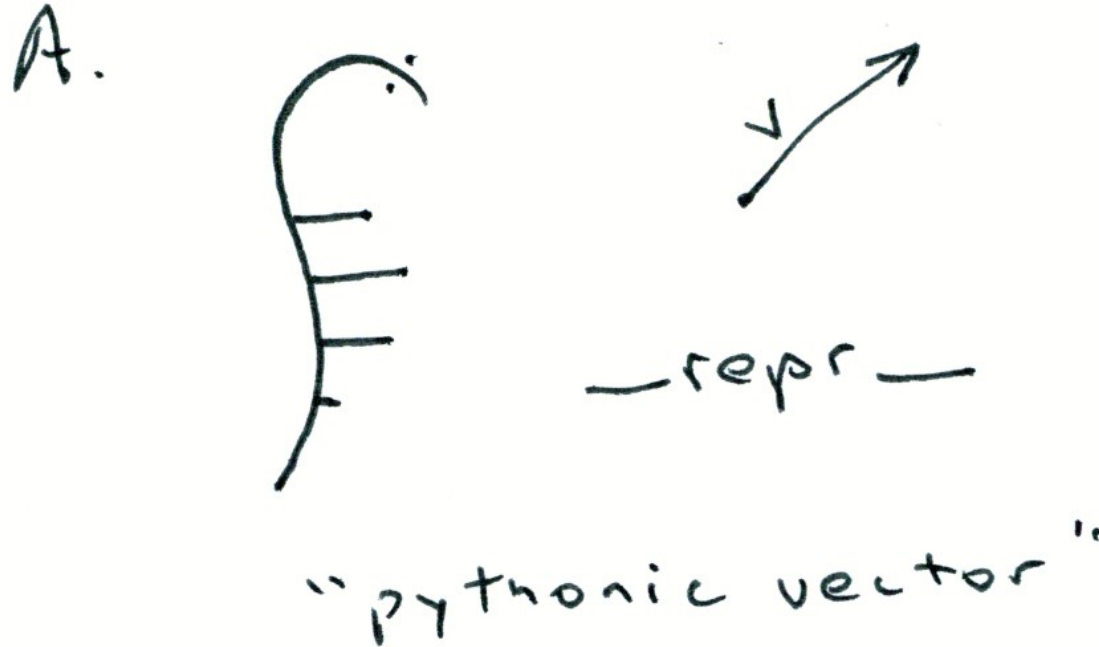
VMs : CPYTHON, JAVA, .NET
 OSs : LINUX, CMS, VAX etc.

D.



Let's look at four "cave paintings" I drew...

Everything is an object...

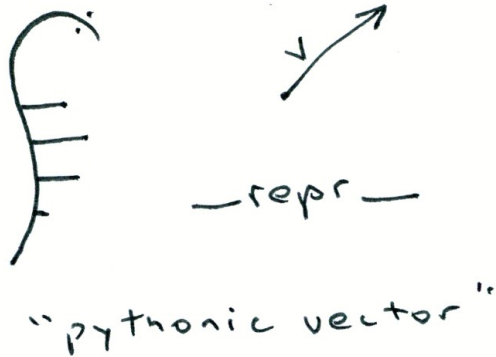


...including "math objects."

Like vectors, polynomials, polyhedra, fractals, factories...
permutations.

Math topics + object-oriented model = a new standard (one of many).

A.



Useful multilingual mnemonic:
a Python has lots of `__ribs__`



```
class Snake (object) :
```

```
def __init__(self):  
    # get born  
    self.stomach = []
```

```
def __repr__(self):  
    # represent self to world  
    return "Snake at %s" % id(self)
```

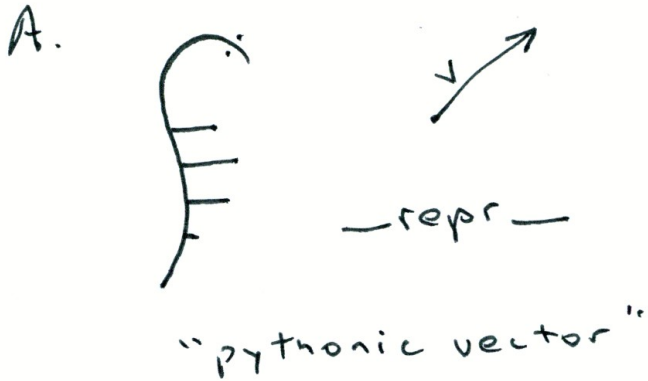
```
def __rib__(self):  
    # any special name  
    pass
```

```
def _rib_(self):  
    # any special name  
    pass
```

```
def eat(self, food):  
    self.stomach.append(food)
```

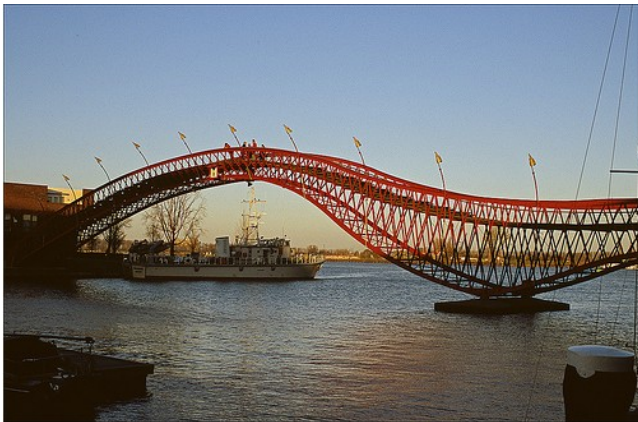
```
def poop(self):  
    # kids like scatalogical stuff  
    # e.g. "grossology"  
    if len(self.stomach) > 0:  
        self.stomach.popleft() # FIFO
```



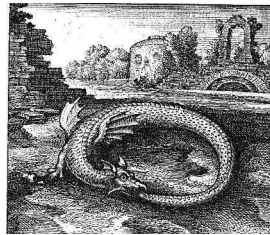


Multi-lingual mnemonic:
a Python has lots of `__ribs__`

```
>>> from europython2007 import Snake
>>> thesnake = Snake() # get born
>>> thesnake
Snake at 14000304
>>> thesnake.eat("mouse")
>>> thesnake.stomach
['mouse']
>>> thesnake.eat(thesnake) # uroboros
>>> thesnake.poop()
>>> thesnake.stomach
[Snake at 14000304]
>>>
```



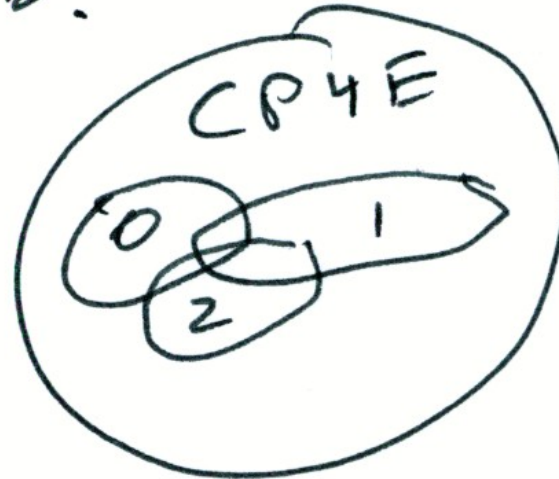
Python Bridge,
Amsterdam



Multi-cultural uroboros imagery

Many languages can do it...

B.



Python is a
“glue” language

The name of the
game is:
Interoperability.

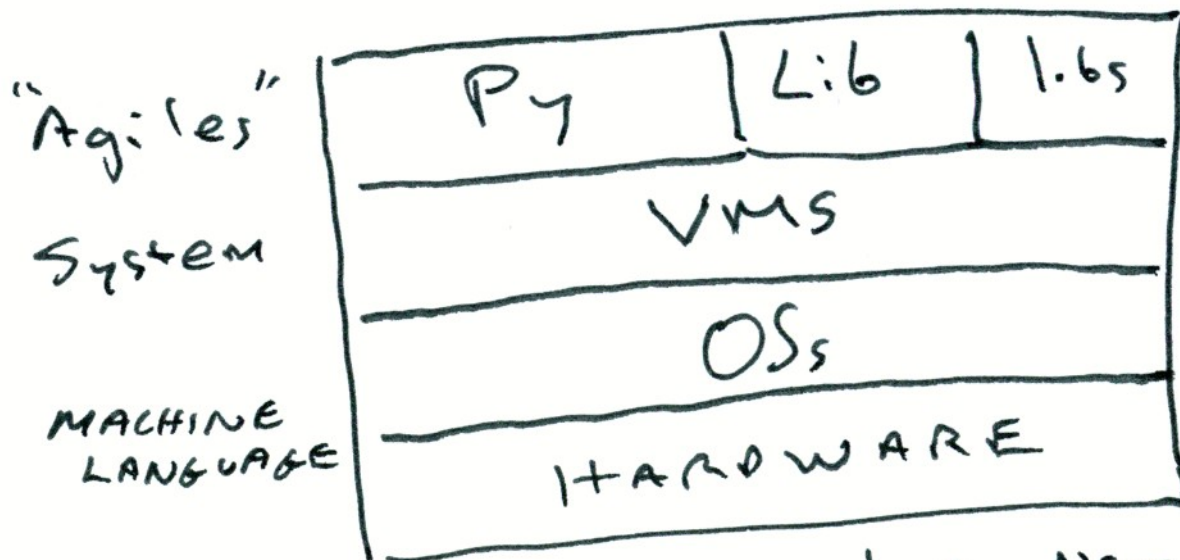
Python plays well
with others

e.g. multiple VHLLs
targeting the same
VM.

0 = Python
1 = other
languages
2 = OLP
= one laptop
per child

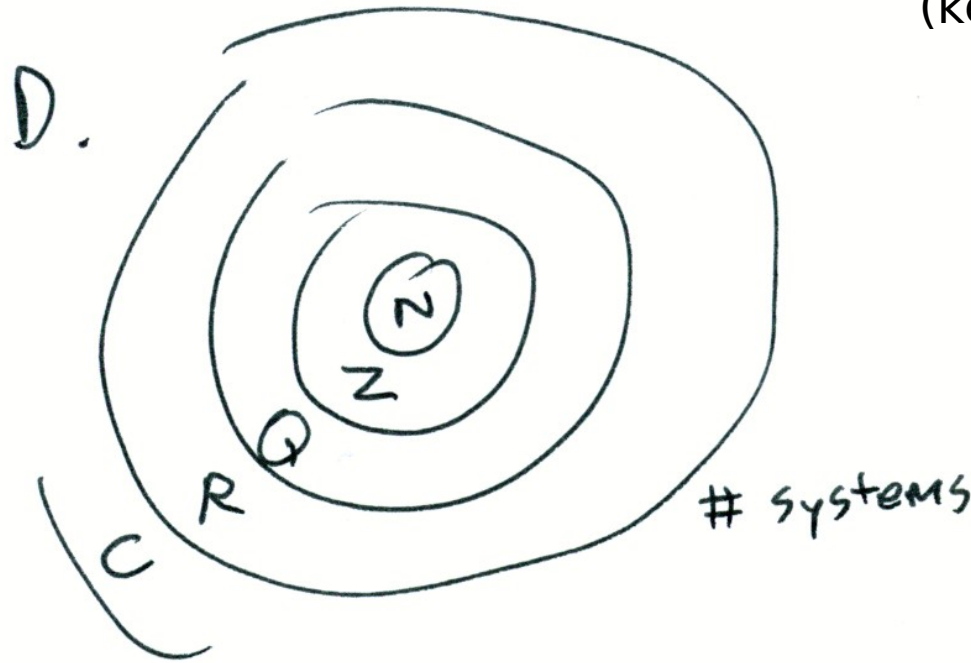
Python @ Home

C.



VMs : CPYTHON, JAVA, .NET
OSs : LINUX, CMS, VAX etc.

Bull's Eye: Aiming for Zero
(keeping it very high level)



KEY:

N = Natural

Z = Integer

Q = Rational

R = Real

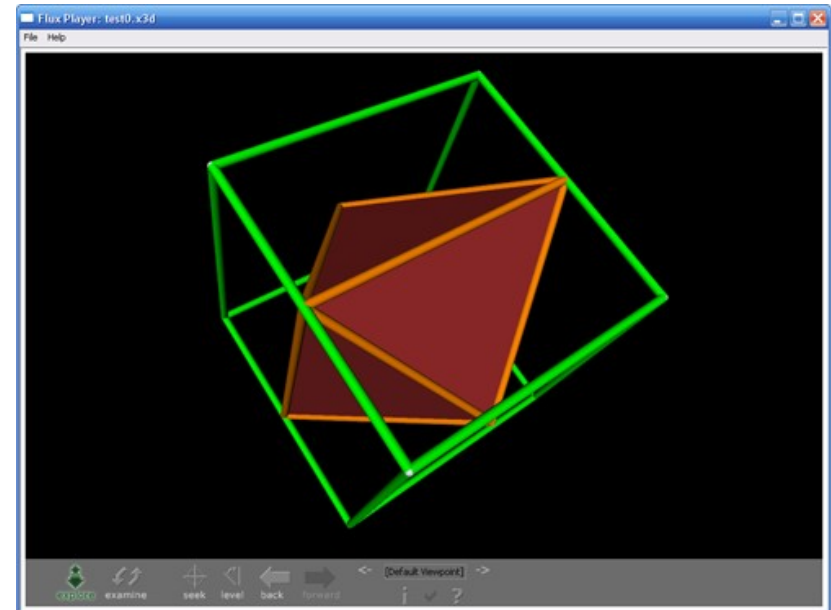
C = Complex

“Math is an Extensible Type System” – K. Urner

“Maths are Extensible Type Systems” – U.K. version

Lexical versus Graphical: finding the right balance

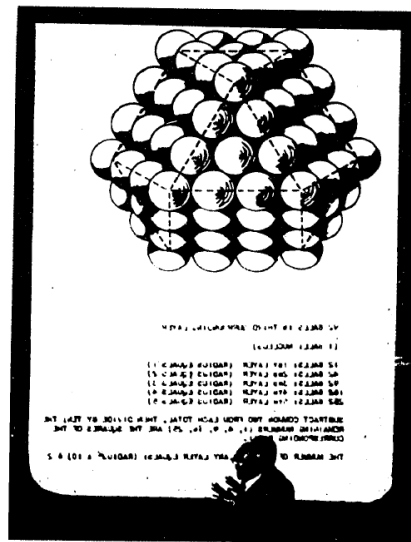
```
gl_theedge = Template(  
    """"  
    cylinder {  
        <$x0, $y0, $z0>,    // Center of one end  
        <$x1, $y1, $z1>,    // Center of other end  
        $radius             // Radius  
        open                // Remove end caps  
        texture { $edge_texture }  
    }  
    """"  
)  
  
gl_thevertex = Template(  
    """"  
    sphere { <$x0, $y0, $z0>, $radius  
        texture { $vertex_texture }  
    }  
    """"  
)  
  
gl_theface = Template (  
    """"  
    polygon {  
        $numcorners,  
        $eachcorner  
        texture { $face_texture }  
    }  
    """"  
)
```



Left: using string.Template to interpolate into POV-Ray's scene description language *Above:* an X3D visualization in FluxPlayer, also template driven.



Lexical-Graphical Bridge One: Figurate and Polyhedral Number Sequences



Fuller as lecturer: Explaining his World Map: expanding upon spherical, his system of "energetic geometry," the "omnidirectional closest packing of spheres," and the benefits of the tetrahedron as a concentration of "two tetrahedra early events." At last count, he had spoken at 431 colleges and universities.

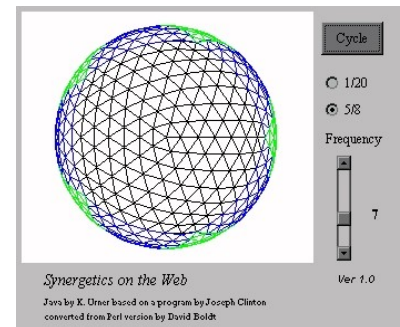
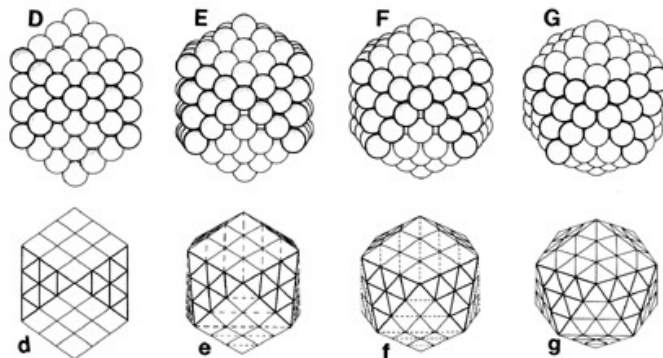
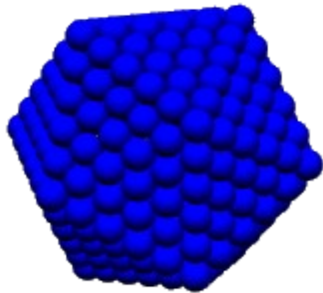
On the homeward journey they told everyone they met about the three or four important letters that might have arrived from Europe during the entire session of the Conference. Last May, he told the Senate Foreign Relations Committee how our representatives 300 years ago were expected to journey to the central meeting place by foot or on horse, stopping at inns and talking with everybody along the way.

same, some do hang up. If they don't, I hang up." Humanity, he thinks, has in much the same way been asking too much of its political representatives. "It has asked them to be responsible for thought." Last May, he told the Senate Foreign Relations Committee how our representatives 300 years ago were expected to journey to the central meeting place by foot or on horse, stopping at inns and talking with everybody along the way.

Polyhedral Numbers: HP4E Fits Here

```
>>> def icoso(f = 1):  
    while True:  
        if f==1:  
            yield 1  
        else:  
            yield 10 * f ** 2 + 2  
        f += 1
```

```
>>> icosanumgen = icoso()  
>>> icosanums = [icosanumgen.next() for i in range(11)]  
>>> icosanums  
[1, 42, 92, 162, 252, 362, 492, 642, 812, 1002, 1212]
```



What is HP4E?

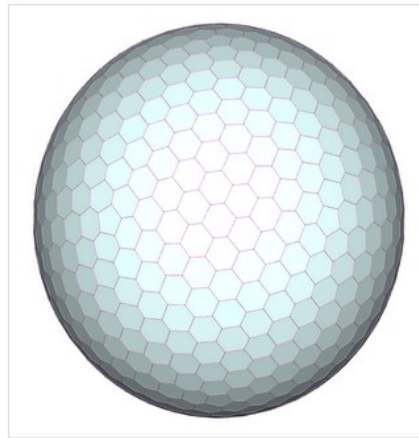
HP4E: HexaPents for Everybody

GRAIN OF SAND

KIRBY PLAYS WORLD GAME

SUNDAY, JULY 23, 2006

Another Hexapent



*Class III Hexapent
Packinon + POV-Ray*

In the shell:

```
geodesic -c 2,3 2 | pol_recip | off_util -O | off2pov > hexapent.pov
```

My thanks to Adrian Rossiter.

ABOUT ME

KIRBY URNER
PORTLAND, OREGON, US

[VIEW MY COMPLETE PROFILE](#)

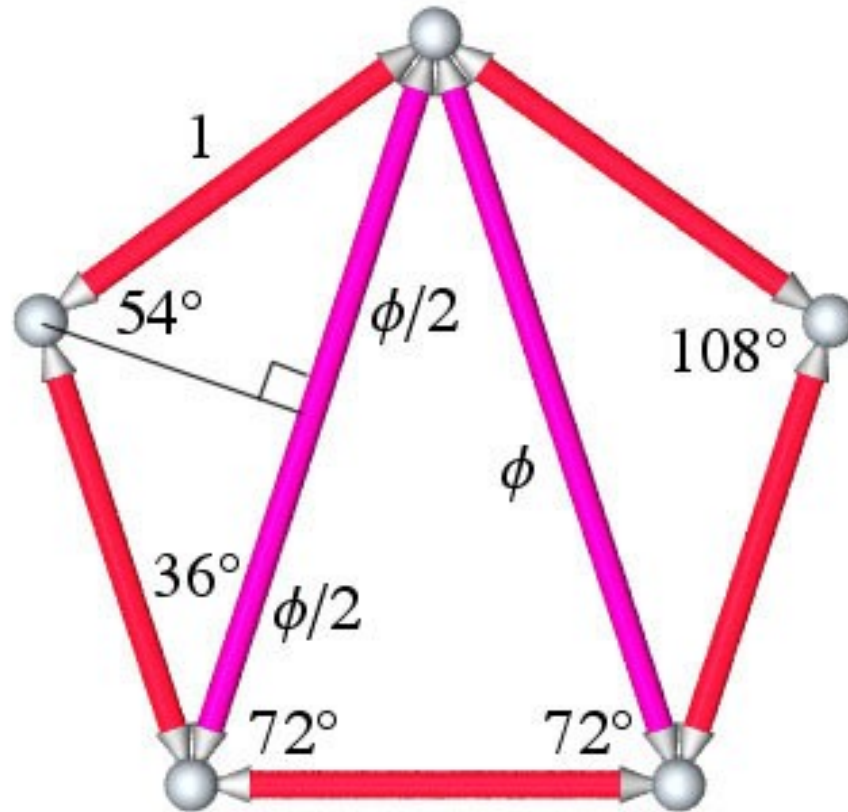


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[Apollo Chronicles](#)
[Rebuilding Indian Country 1933
\(movie review\)](#)
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[PR for the PL](#)
[Repositioning Think Tanks](#)
[Alternative View](#)
[Taking Refuge in J](#)
[MI3 \(movie review\)](#)
[Movie Sunday](#)
[Back in the USSA](#)

LINKS

HP4E ♥ Pentagon Maths



$$2 \sin (54^\circ) = 2 \cos (36^\circ) = \phi$$

By K. Urner, with Python + POV-Ray, for Design Science Toys



Lexical-Graphical Bridge Two: Vectors, Edges & Faces in a Computational Geometry

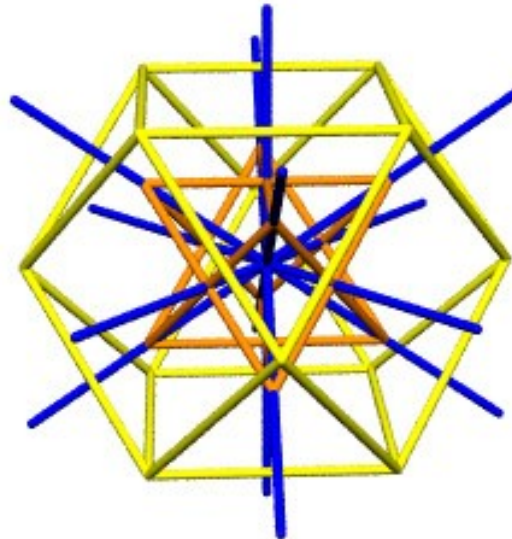
vector, scalar

$v_0 + v_1$ (`__add__`)

$s * v_0$ (`__mul__`)

Descartes, Hamilton,
Gibbs, Grassmann,
Clifford et al

quadrays,
quaternions



XYZ, CCP

$V + F = E + 2$

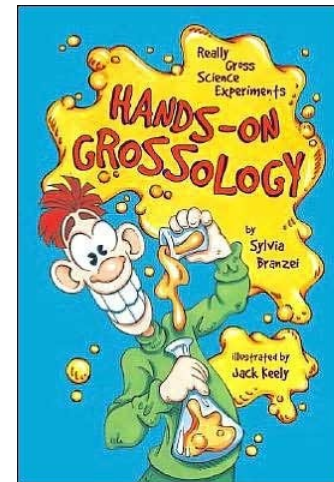
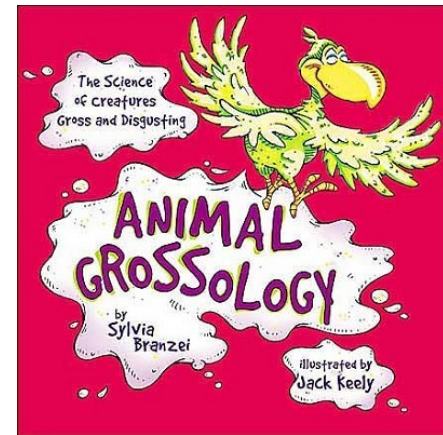
edges, surface,
volume

spin, scale,
translate

linear algebra

string.Template: Mad Libs

```
def poop(self):  
    # kids like scatological stuff  
    # e.g. "grossology"  
    if len(self.stomach) > 0:  
        self.stomach.pop(0) # FIFO
```



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Fear Factor Mad Libs: Ultimate Gross Out! (Mad Libs)

by Roger Price



About This Book

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ISBN10: 0843111577
All Product Details

RELATED AISLES

- Children's Games
- Children's Activities Mad Libs General
- Games Mental Puzzles

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No Items

string.Template: Mad Libs

Google - gross madlib

AmazonOnlineReader View Page of 52 Highlight Bookmark Copy Print Help

Return to Amazon.com

Year Online Books

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Leonard Stern

Price: \$3.99

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\$9 used and new from \$0.82

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Highlights/Bookmarks

Fear factor

Copyrighted Material
MAD LIBS
TO FEAR OR NOT TO FEAR

Hang on tight, because you're about to _____ the most disgusting _____ around! Whether you're eating a giant _____ or being buried in live _____, you'll be having some serious *Fear Factor* fun! On the show, players race to _____ the grossest things you've ever seen. Every episode brings something _____ and new, like diving into a/an _____ full of dirty _____ or putting wiggling _____ into your mouth. You'll have to _____ weird animals and _____ body parts. One thing's for sure: If you can do these _____ stunts, fear is not a factor for you!

VERB
PLURAL NOUN
SOMETHING ALIVE
ANIMAL (PLURAL)
VERB
ADJECTIVE
NOUN
TYPE OF LIQUID
SOMETHING ALIVE (PLURAL)
VERB
ADJECTIVE
ADJECTIVE

string.Template: X3D etc.

```
gl_theedge = Template(
    """
    <Transform translation = "$translate">
      <Transform rotation = "$roty">
        <Transform rotation = "$rotx">
          <Shape>
            <Cylinder height="$length" radius="$radius"
              containerField="geometry"
              side="true" solid="true" top="true" />
            <Appearance>
              <Material diffuseColor="$color"/>
            </Appearance>
          </Shape>
        </Transform>
      </Transform>
    </Transform>
    """
)
```

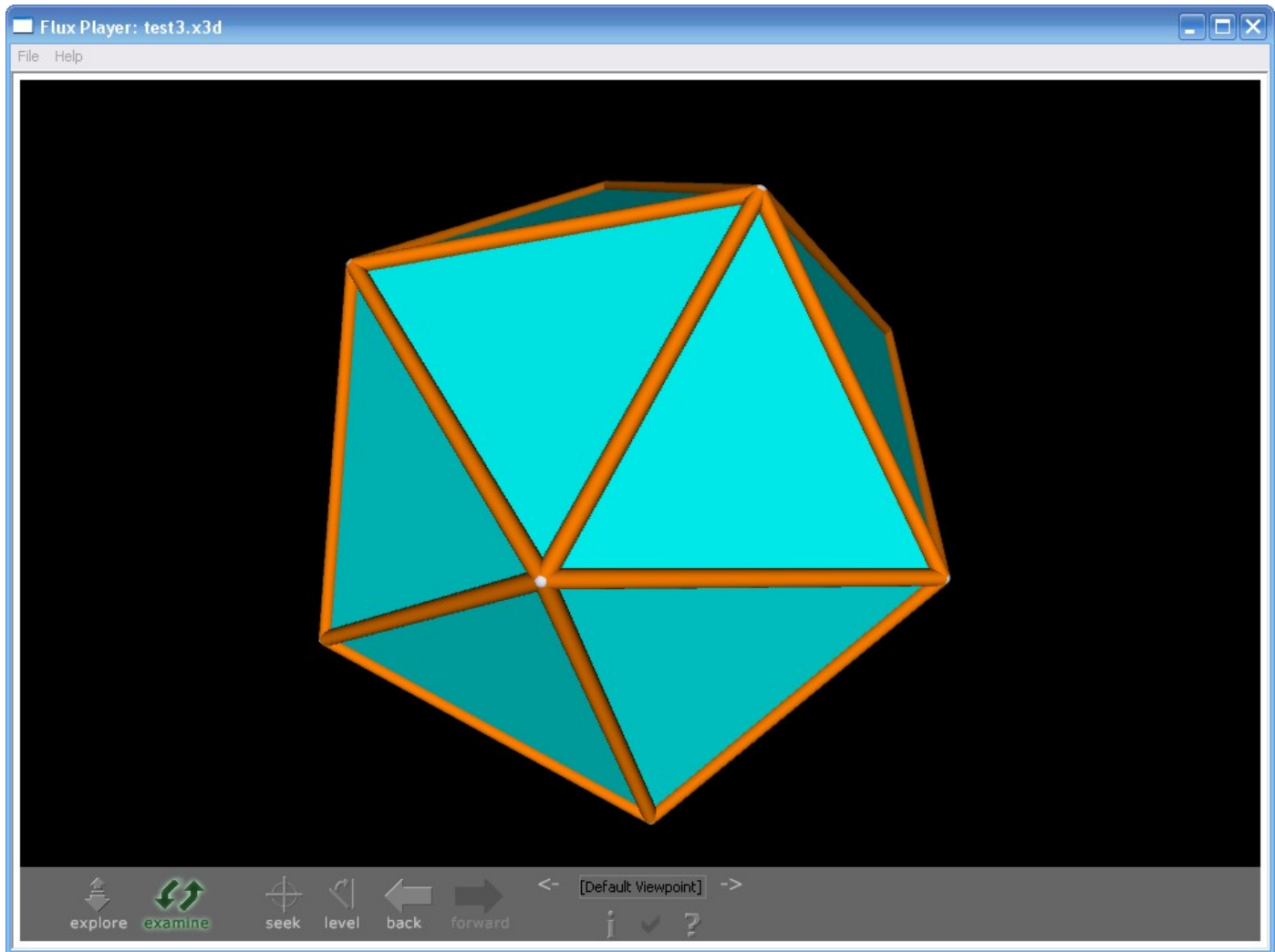
gl_theedge is boilerplate X3D (XML version)

string.Template: X3D etc.

```
edict = dict(  
    radius      = edge.radius,  
    color       = colordict[someobj.ecolor],  
    length      = length,  
    translate   = "%r %r %r" % vrmldata[0],  
    roty        = "0 1 0 %s" % roty,  
    rotx        = "1 0 0 %s" % rotx)  
  
someobj.text = someobj.text + gl_theedge.substitute(edict)
```

edict contains key:value pairs for an X3D Edge

X3D: Visualizing a Model





Lexical-Graphical Bridge Three: Geography

GIS / GPS

SQL

XML-RPC

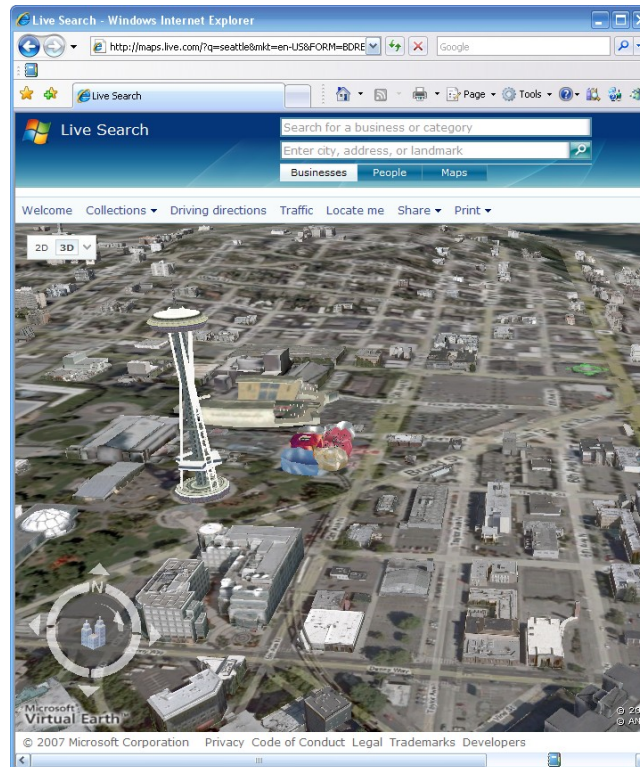
AJAX

CGI

Client side

Server side

Web services



TCP/IP

Internet

Networks

GST

Astronomy

Physics

Geocaching

Surveying

SQL + CGI: a “bare bones” beginning

A Geography Quiz: Understanding Databases

by Kirby Uerner
First posted: March 11, 2005
Last modified: October 14, 2005

Our way of life depends on the existence of large repositories of information known as databases. When you buy an airline or theater ticket, chances are that this transaction is processed through one or more databases. The database will show who has paid for what, what seats have been reserved, and so on. Many sales representatives may be processing transactions through the same databases at the same time. Databases run on computers, large and small, all around the world. Some are accessible through the Internet, while others are only accessible to people inside a company, government agency, or private home.

A database may begin life as an electronic text file or script, the purpose of which is to define its tables and maybe populate them with data. Below is an example of such a script. The database it defines consists of only one table: states.

A table consists of rows and columns. In this case, each row is a state or territory associated with the USA. Each column contains a certain type of information: state name, abbreviation, two-letter postal code, and state capital. The raw information the script uses to fill the table, once it's defined, is called [newstates.txt](#). Notice the use of quotes and commas -- a very typical format.



Data sets from databases are often displayed on maps. This Fuller Projection is showing average annual temperature data

What is the capital of Minnesota? (MN)



[Return to geoquiz home page](#)

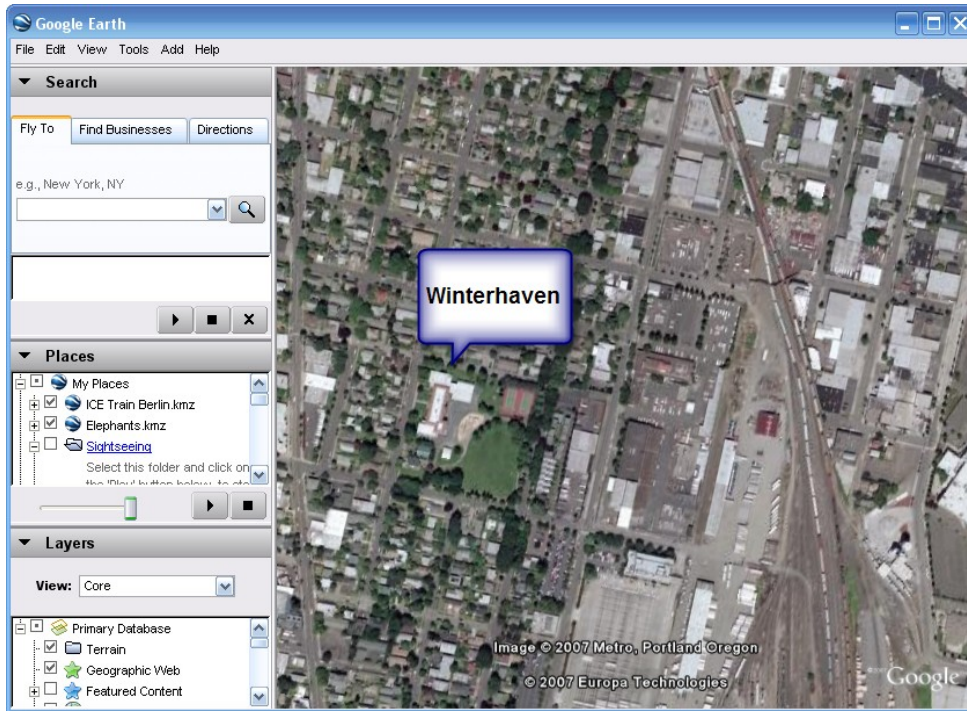
You got it right!

The capital of Minnesota is St Paul

<http://www.4dsolutions.net/ocn/geoquiz.html>



XML & Web Services



```
<?xml version="1.0" encoding="ISO-8859-1" ?>
- <cities>
- <city name="Syracuse" state="N.Y.">
  <lat deg="43" min="2" dir="N" />
  <long deg="76" min="8" dir="W" />
</city>
- <city name="Boise" state="Idaho">
  <lat deg="43" min="36" dir="N" />
  <long deg="116" min="13" dir="W" />
</city>
- <city name="Anchorage" state="Alaska">
  <lat deg="61" min="13" dir="N" />
  <long deg="149" min="54" dir="W" />
</city>
```

```
>>> import xmlrpclib
>>> server_url = 'http://rpc.geocoder.us/service/xmlrpc'
>>> server = xmlrpclib.Server(server_url)
>>> address = "3745 SE Harrison St., Portland, OR 97214"
>>> result = server.geocode(address)
>>> result
[{'city': 'Portland', 'prefix': 'SE', 'suffix': '', 'zip':
97214, 'number':
3745, 'long': -122.624652, 'state': 'OR', 'street':
'Harrison', 'lat':
45.508740000000003, 'type': 'St'}]
```

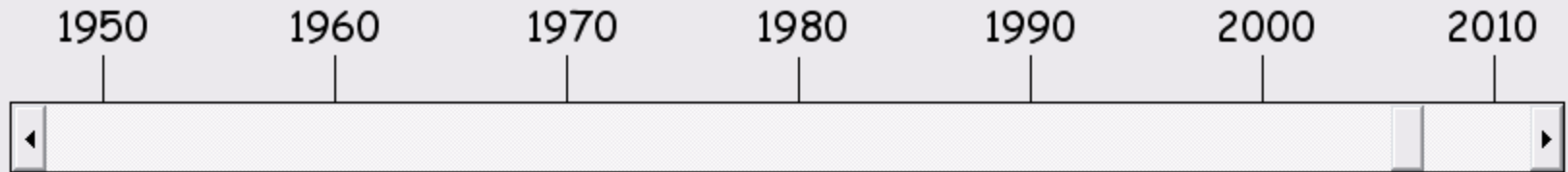
<http://www.4dsolutions.net/ocn/winterhaven/>



Lexical-Graphical Bridge Four: Game Engines with Python Bindings



More recent autobio...



CHALMERS

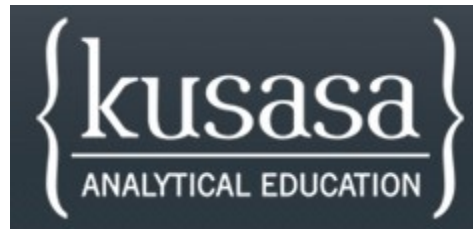
NO5

EuroPython 2005 (Chalmers): Pythonic Math, HP4E links

OSCON 2005 (PDX) : Friends of Fuller ♥ open source

Shuttleworth Foundation 2006 (London): Kusasa project

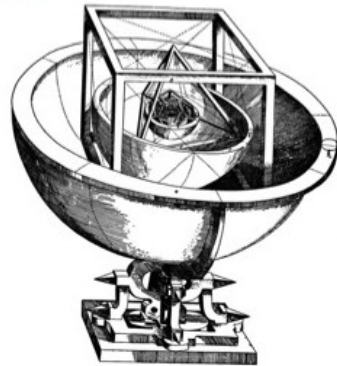




- Less reliance on expert authorities (peers teaching peers)
- A focus on modeling, endowing objects with behaviors
- Immersive environments implemented in software
- Students demonstrate their ability to learn and apply tools without becoming too attached to any specific tool

How does modelling help learners to learn?

Modelling is not a new development. From [Eratosthenes](#) to Einstein, scientists have been building mental models to understand all the wondrous phenomena of the cosmos. Throughout most of history the great mathematicians and scientists upon whose shoulders we now stand developed their models by prediction, observation, experimentation and reflection using all the available tools of their time. They would draw diagrams. They would build physical models. They would create objects to think with: anything to help them capture the fleeting ideas that would occur to them in flashes of inspiration. For the most part, their progress was slow but sure.



How will Kusasa build on learners' personal interests?

Kusasa brings to education what every parent knows all too well: children learn best through play. Indeed as a learning methodology play works just as well for adults as it does for children. Does this mean that Kusasa is just frivolous fun? Certainly not. The learning that takes place through Kusasa's [modelling](#) projects is hard fun in the same way that learning to walk is hard fun: it's tough but it's irresistible.



A project of The Shuttleworth Foundation

P4E in PDX

- 2004:

Adventures in Open Source (sa:); West Precinct, HPD;
J. Collord & K. Urner

- 2005 – 2006:

Python @ Winterhaven Public School; K. Urner



- 2005 – 2007:

Pythonic math courses (sa:); OGI, PSU; K. Urner

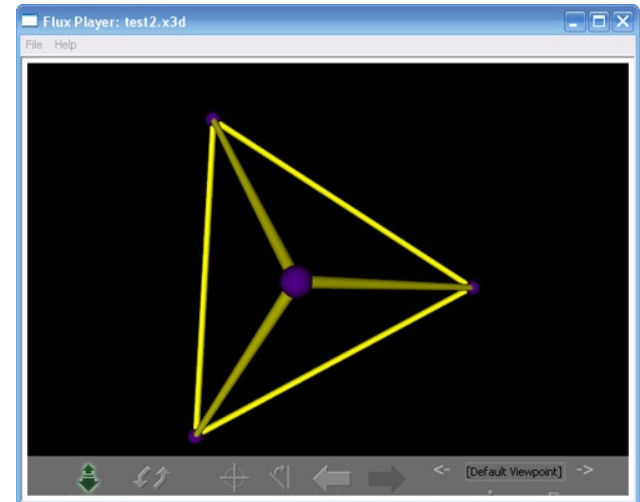
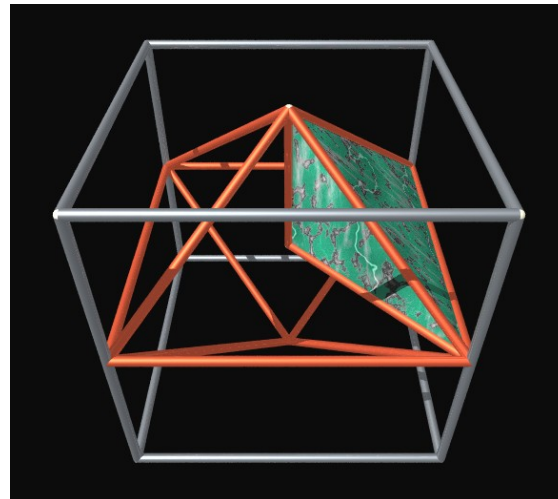
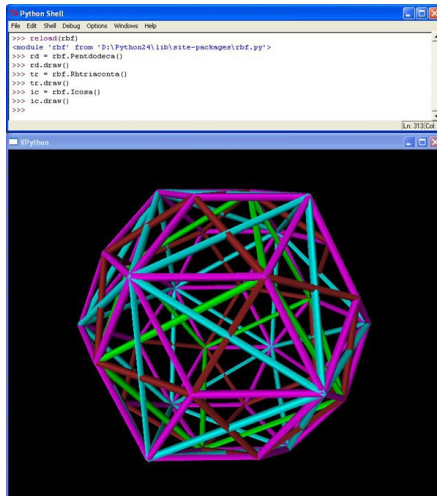


Saturday Academy: recruiting new Silicon Foresters



Model, View, Controller

Model: polyhedra.py; Views: VPython, POV-Ray, X3D; Controller: *toyz.py



<http://www.4dsolutions.net/ocn/cp4e.html>



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Related PDFs:

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