

The Integration of ArcGIS Server with Google Maps:

MIT's Online Campus Map



Presented by:

William Witts

MIT Department of Facilities
Facility Information Systems

wwitts@mit.edu

Agenda

- Introduction
- History of online campus map, “Whereis”
- Why Whereis was updated
- New Whereis – ArcGIS Server
- Future plans

Facility Information Systems

- Responsible for:
 - ▶ Archives and record documents
 - ▶ Space accounting
 - ▶ Campus mapping
 - ▶ Utility distribution plans
 - ▶ Application support
- Belong to Facilities IT Group
 - ▶ Work with Application Desktop Services

Whereis

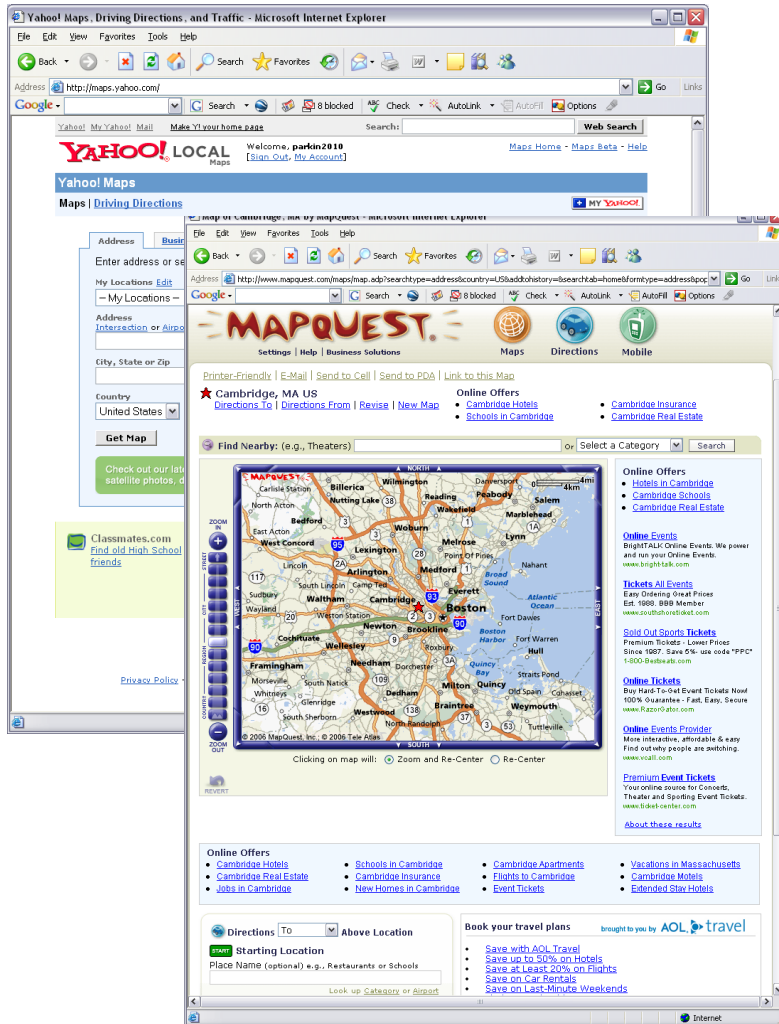
History of online map

- Online map in 1997 Map
 - ▶ Static GIFs
 - ▶ Site was maintained by IS&T.
 - ▶ Was not dynamic in nature
 - ▶ Worked well, but wanted to be less work to maintain
 - ▶ Disassociated from other data (not the official source)

History of online map

- 2002 meeting of Facilities and Homepage Team
 - ▶ Wanted to update maps
 - ▶ Need a better process to update map
 - ▶ Scalable and able to stand the test of time
 - ▶ Facilities would maintain map data and IS&T would manage service and content

Web mapping in 2002

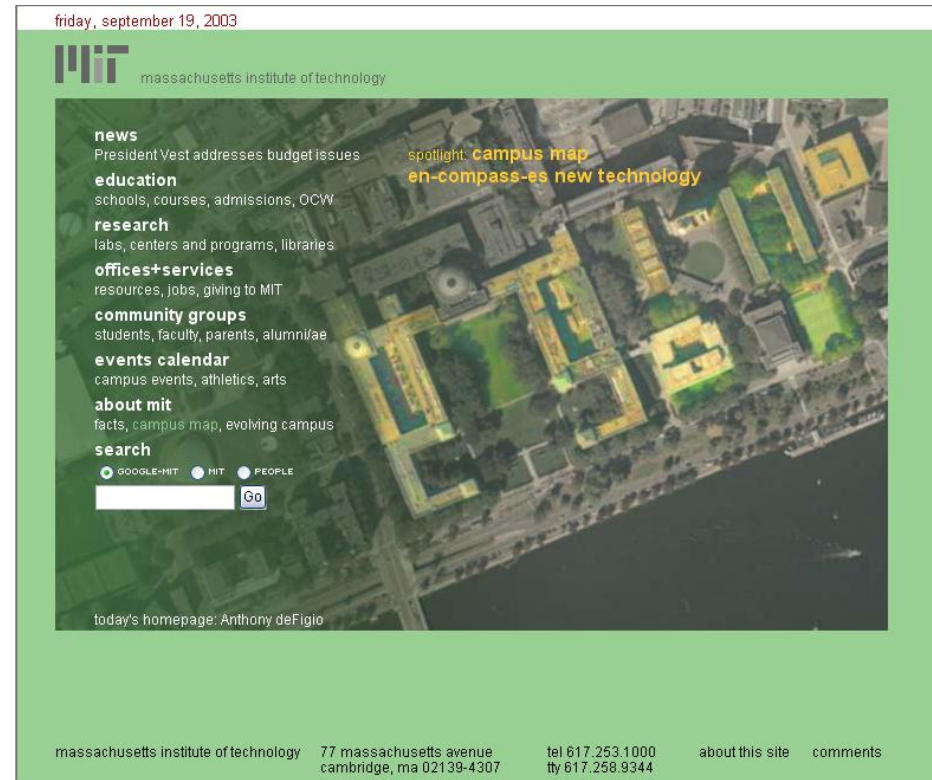


Popular online mapping:

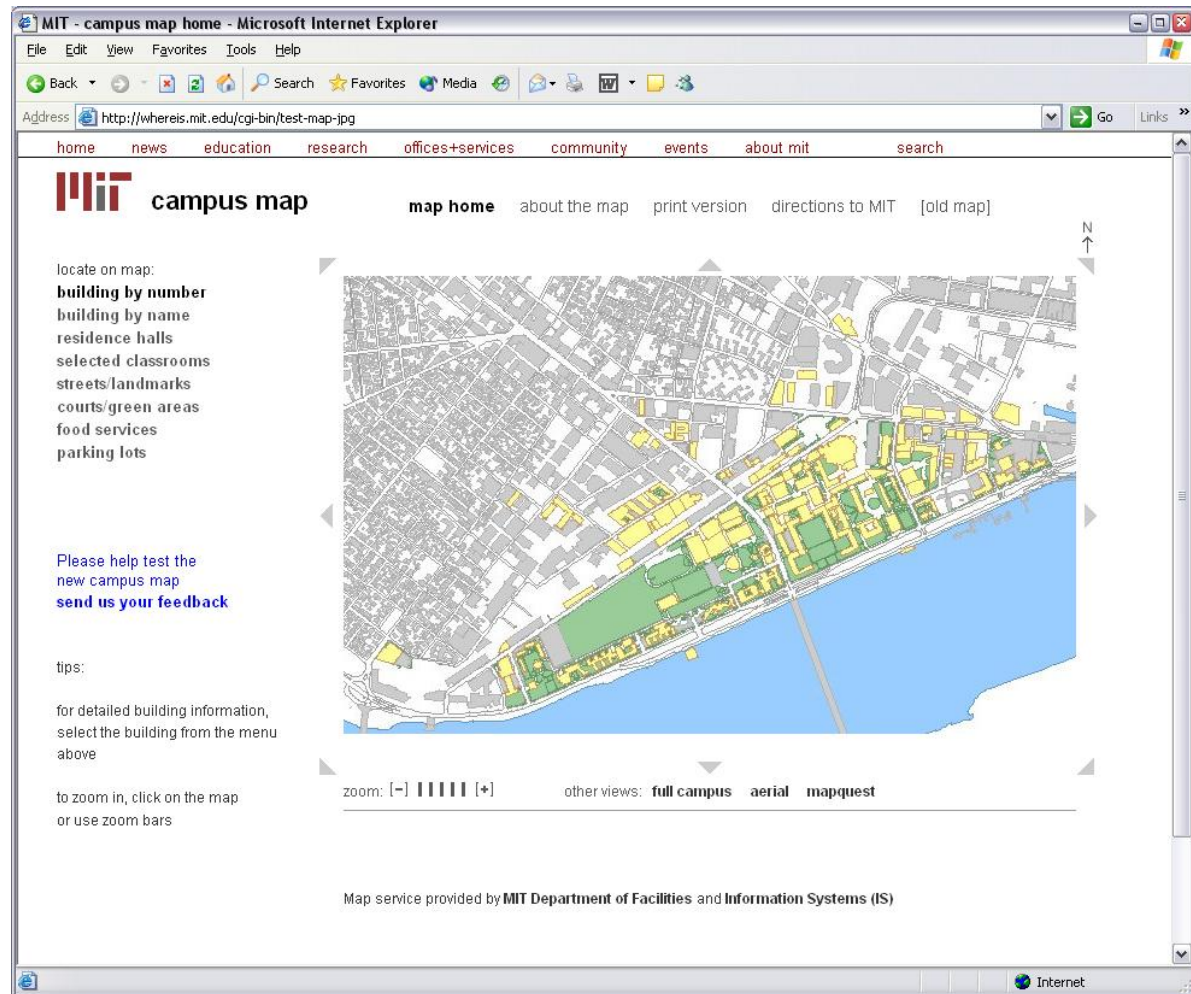
- Mapquest
- Yahoo! Maps

Whereis 2003

- 2003 Map –the new Whereis map
 - ▶ Officially unveiled September 19, 2003
 - ▶ Dynamic in nature
 - ▶ Tied to Facilities information
 - ▶ ArcIMS



Whereis 2003



Whereis 2003

MIT - campus map home - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address <http://whereis.mit.edu/cgi-bin/test-map.jpg?selection=4;section=home;selectfield=facility;selectlayer=Buildings;centerx=710368;centery=495584;zoom=level3;> Go Links

home news education research offices+services community events about mit search

MIT campus map map home about the map print version directions to MIT [old map]

locate on map:
[building by number](#)


1
2
3
4

building by name
residence halls
selected classrooms
streets/landmarks
courts/green areas
food services
parking lots

Please help test the new campus map
[send us your feedback](#)

tips:
for detailed building information, select the building from the menu above
to zoom in, click on the map or use zoom bars

Building 4 (Maclaurin Buildings)




zoom: [-] ||| [+]

other views: full campus aerial mapquest

Building 4 (Maclaurin Buildings)
street address: 182 Memorial Drive (Rear)

mailing address:
Building 4
77 Massachusetts Avenue
Cambridge, MA 02139-4307

Floor Plans (MIT access only: Adobe Acrobat Reader required)
0 1 1M 2 3 4 4M 5



architect: William Welles Bosworth

Map service provided by MIT Department of Facilities and Information Systems (IS)

<http://whereis.mit.edu/cgi-bin/test-map.jpg?selection=4;section=home;selectfield=facility;selectlayer=Buildings;centerx=710368;> Internet

Whereis 2003

- Provided more functionality
 - ▶ Could now locate an MIT building, department, office, or other location
 - ▶ Get directions to MIT
 - ▶ Provide links for other departments
 - ▶ More information about what is in a building
 - ▶ Add other information, such as aerial photography

Whereis 2003

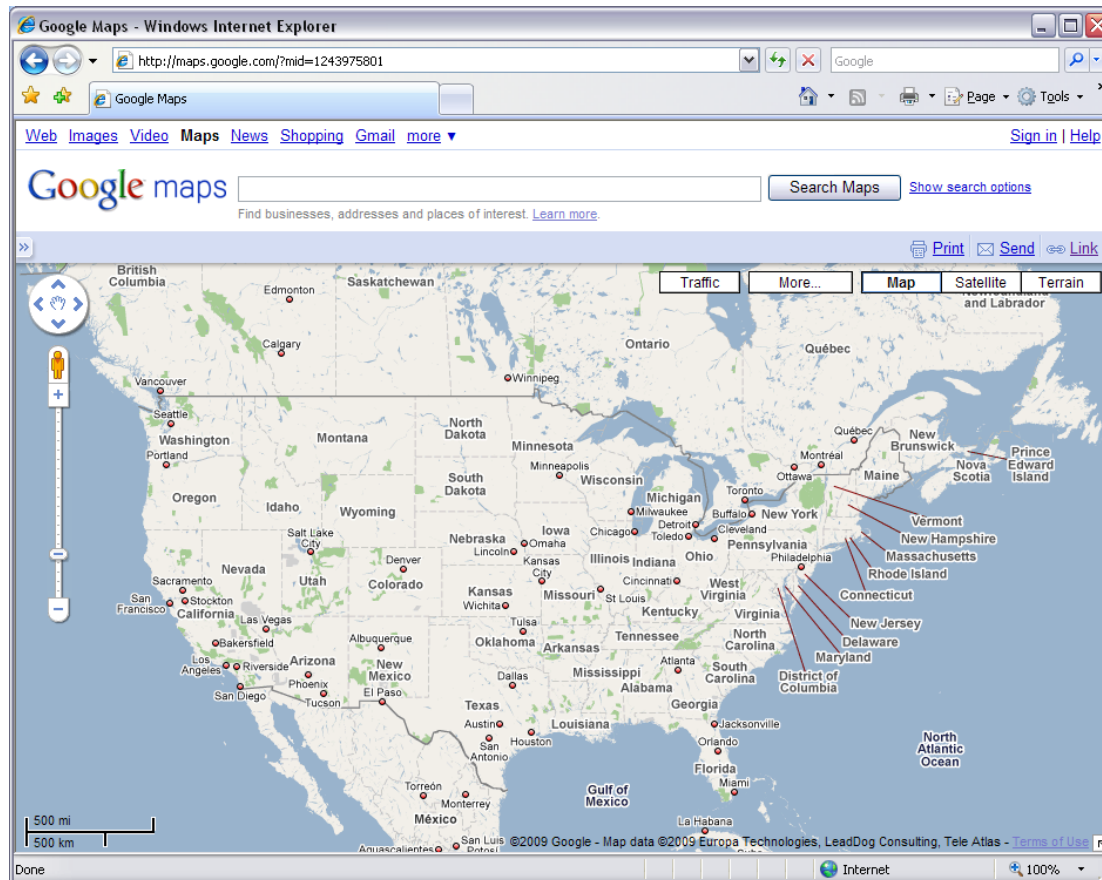
- ArcIMS back end
- 1 request, 1 map
- Anywhere between 800 and 2000 map requests an hour
- Very little down time

Issues with 2003 Whereis

- Two separate ArcIMS installations
- Map data “slight disconnect”
- Need to acquire data through the region
- Map service was dated
- Users expected higher level of interactivity

Paradigm shift

- Google has set expectations for end users



Do no evil...mapping.

New paradigm

- Web mapping Google Maps:
 - ▶ Tile caches (extreme high performance)
 - ▶ Author driven base maps
 - ▶ Google Maps API



Whereis 2009

- Committee formed in 2007
- Wanted to update the existing map, but maintain the idea of IS&T supports server and Facilities maintains map data
- Needed new framework that would let us use Google and other web clients

Whereis 2009

- Provide MIT content only
- Better mapping performance
- Real Time data updates
- Wide variety of searches
- True scalable system
- Existing Capabilities while providing a better user experience

Whereis 2009

- ArcGIS Server:
 - ▶ Dynamic services and cached services
 - ▶ Driven directly SDE
 - ▶ Online SDK's (JavaScript API, Flex API, .NET API, etc.)
 - ▶ True web services (REST)

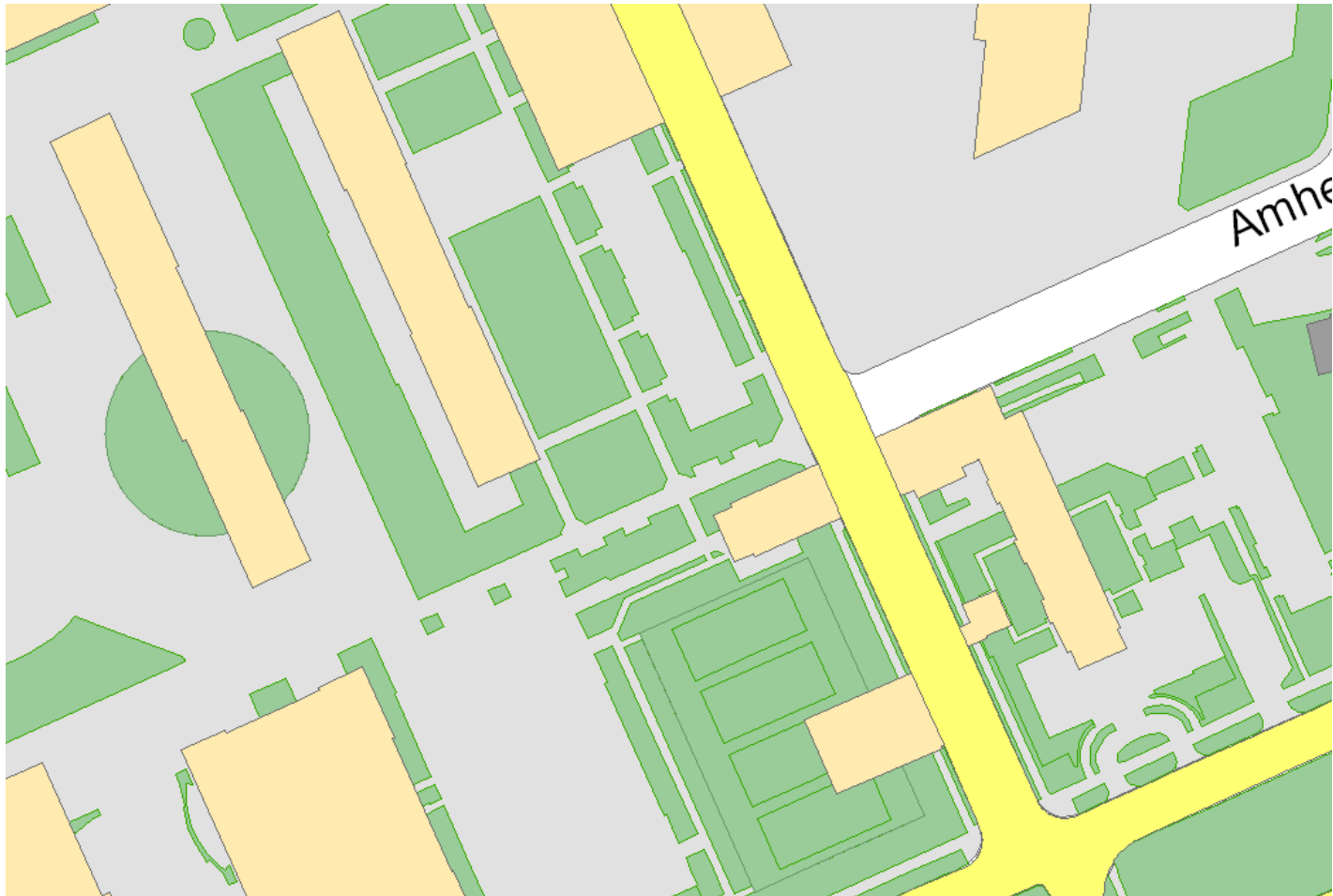
Whereis 2009

- Facilities GIS
 - ▶ Update GIS workflow
 - ▶ Build tile cache
 - ▶ JavaScript API
- IS&T magic
 - ▶ Better search
 - ▶ Better support
 - ▶ Google Maps API

Caches in ArcGIS Server

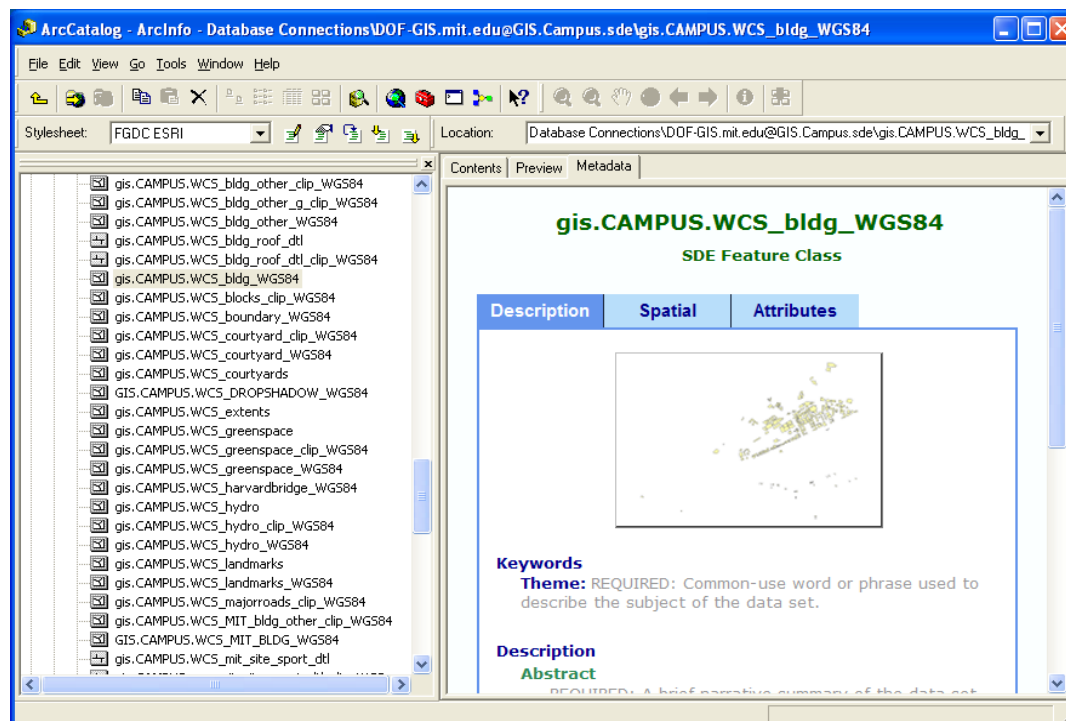
- Re-project Map Data:
 - ▶ Google Maps - World Geodetic System (WGS) 1984 Web geographic coordinate system (datum)
 - ▶ MIT - North American Datum of 1927 (NAD27) Massachusetts Mainland State Plane Feet

Caches in ArcGIS Server

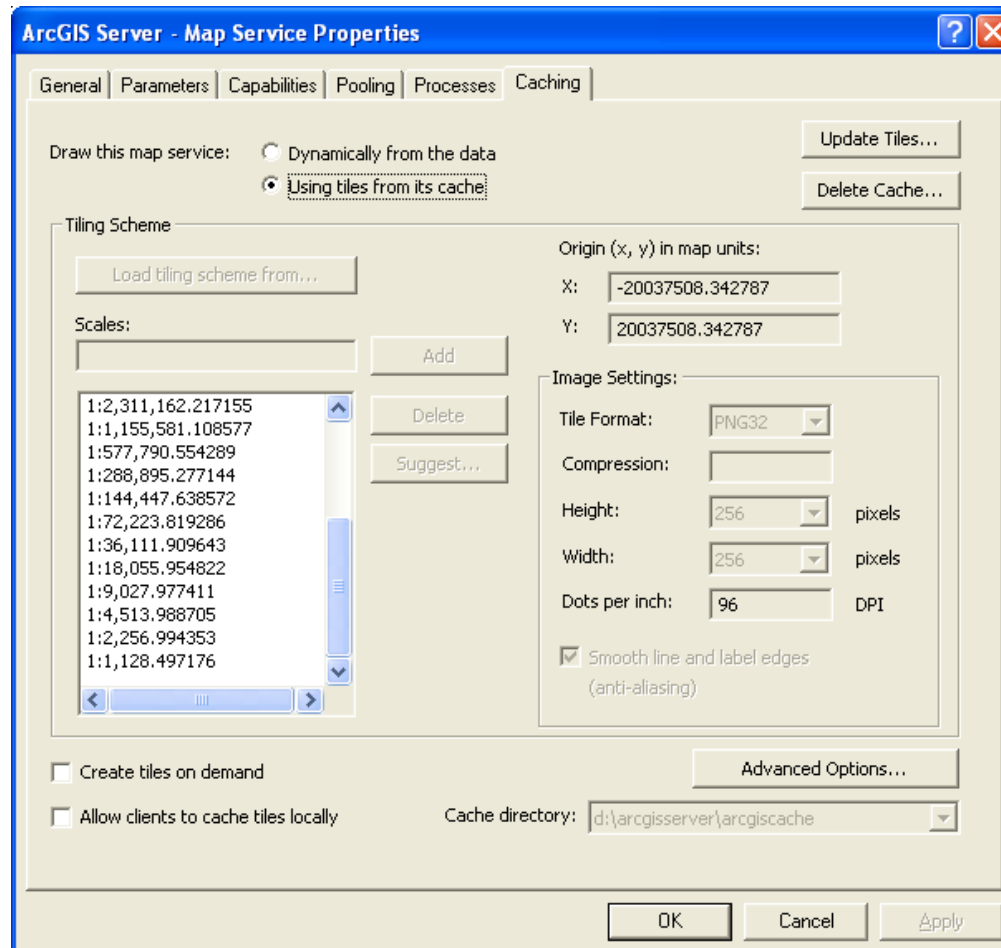
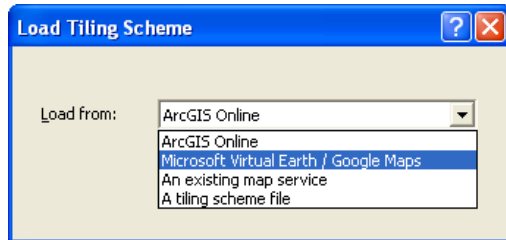


Caches in ArcGIS Server

- Re-project Map Data:
 - ▶ 15 Map features needed to be translated



Caches in ArcGIS Server



Caches in ArcGIS Server

- Determine scale to draw:
 - ▶ 1: 36,111
 - ▶ 1: 18,055
 - ▶ 1: 9,027
 - ▶ 1: 4,513
 - ▶ 1: 2,256
 - ▶ 1: 1,128

Caches in ArcGIS Server

- Determine scale to draw:
 - ▶ 1: 36,111



Caches in ArcGIS Server

- Determine scale to draw:
 - ▶ 1: 18,055



Caches in ArcGIS Server

- Determine scale to draw:
 - ▶ 1: 9,027



- Determine scale to draw:
 - ▶ 1: 4,513



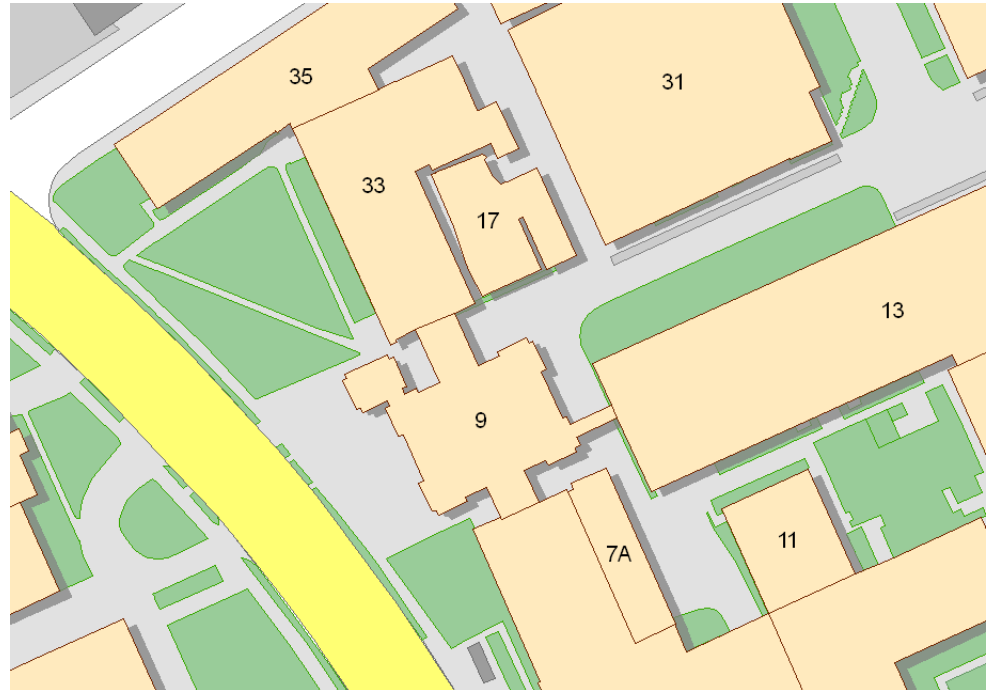
Caches in ArcGIS Server

- Determine scale to draw:
 - ▶ 1: 2,256



Caches in ArcGIS Server

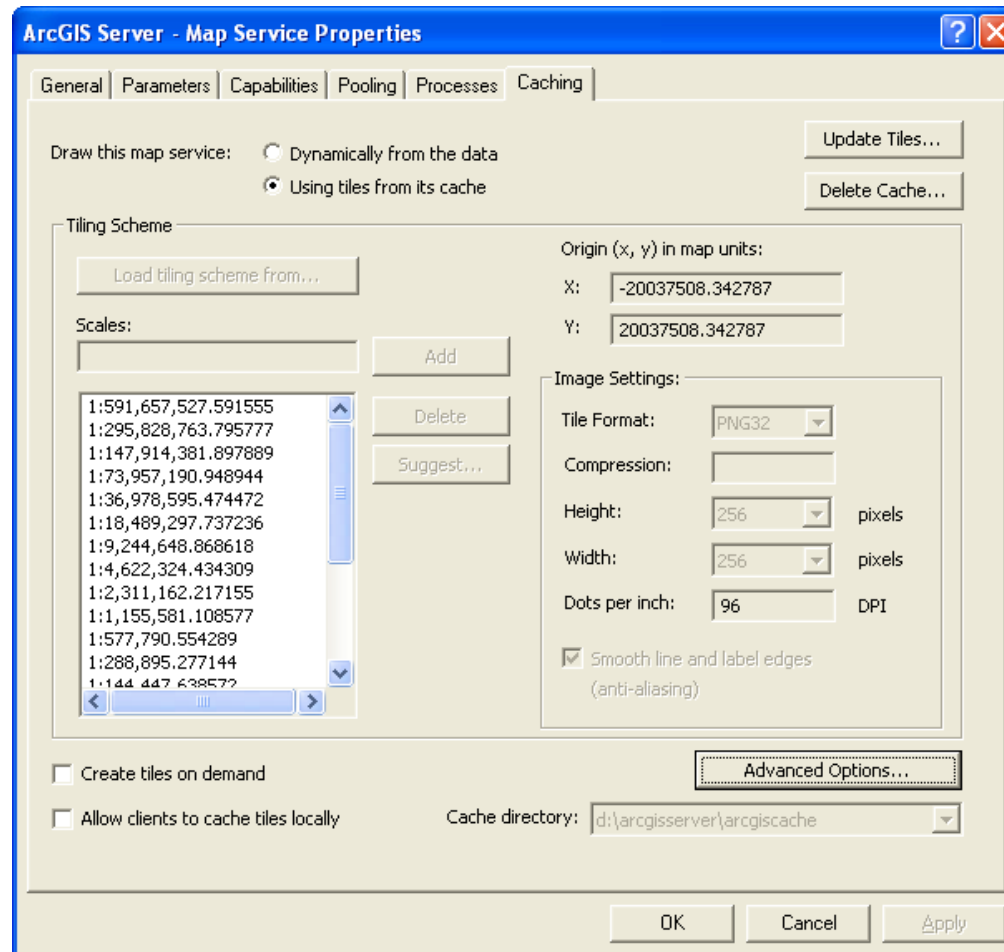
- Determine scale to draw:
 - ▶ 1: 1,128



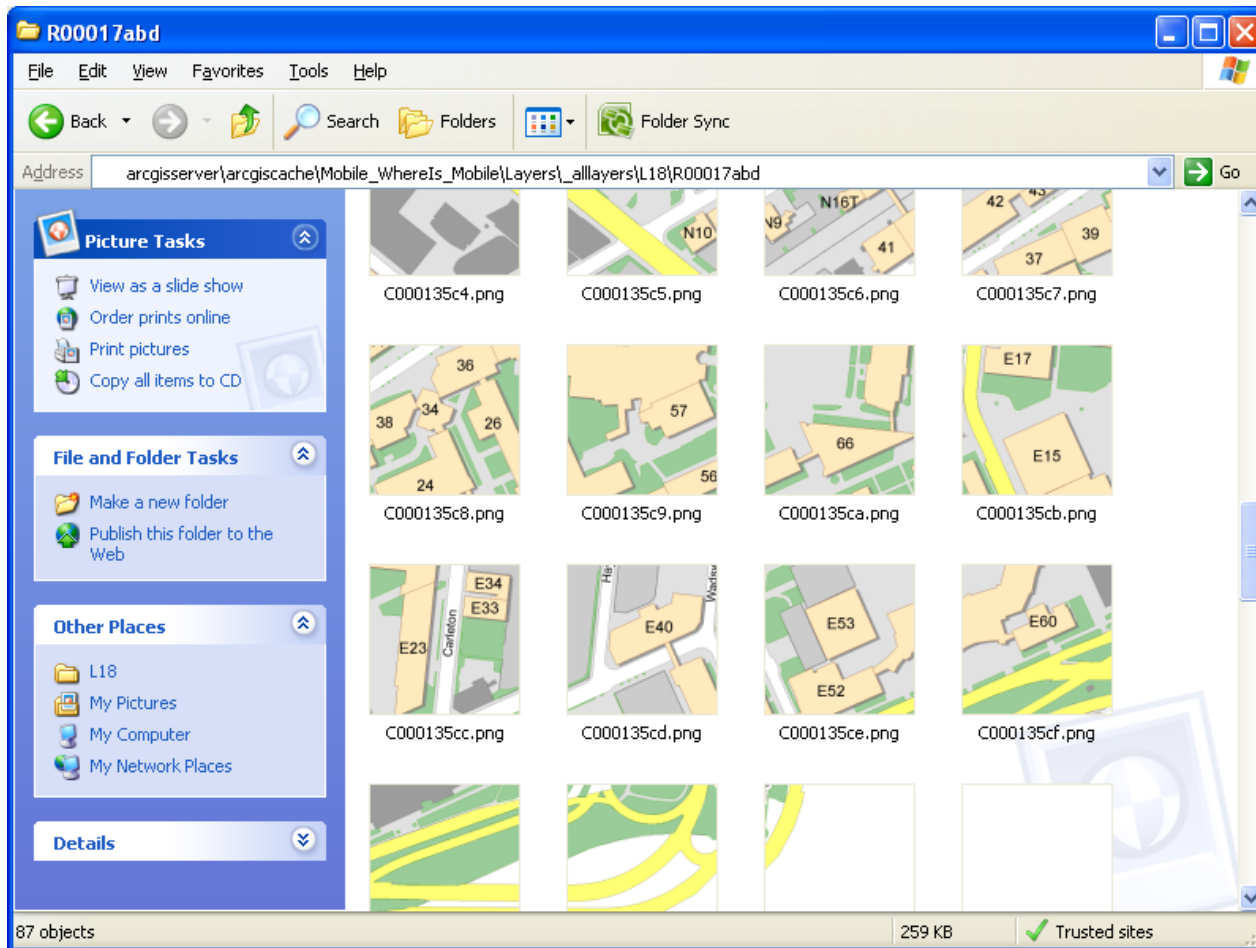
Caches in ArcGIS Server

- Issues:
 - ▶ Google maps road network on campus not as accurate as we had hoped
 - ▶ Dynamic labels – NO GO

Caches in ArcGIS Server



Caches in ArcGIS Server



New Whereis map



ArcGIS Resource Centers

ArcGIS Server » Web Applications » Javascript APIs

Customer Care | Support | Careers

Search

Login

Resources Gateway

Resources

Data Management

Help

Communities

ArcGIS Server JavaScript™ APIs

You can build ArcGIS Server Web applications using pure JavaScript™ APIs powered by backend REST services that are hosted on any ArcGIS Server. No development or deployment license is required on the Web server hosting your application.

[ArcGIS API for JavaScript™](#)



Embed maps and tasks from any ArcGIS Server into your Web site.

[ArcGIS JavaScript™ Extension for the Google Maps™ API](#)



Combine your organization's GIS content with content from other organizations on top of Google Maps base maps.

[ArcGIS JavaScript™ Extension for Microsoft Virtual Earth™](#)



Combine your organization's GIS content hosted in ArcGIS Server with content from other organizations on top of Microsoft Virtual Earth™ base maps.

New Whereis map

http://maps.mit.edu/ArcGIS/rest/services/Base/WhereIs_Base/MapServer

ArcGIS Services Directory

[Home](#) > [Base](#) > [WhereIs_Base \(MapServer\)](#)

Base/WhereIs_Base (MapServer)

View In: [ArcMap](#) [ArcGIS Explorer](#) [ArcGIS JavaScript](#) [Google Earth](#) [Virtual Earth](#) ([terms of use](#))

View Footprint In: [Google Earth](#)

Service Description: Map service for Where Is Google Maps

Map Name: Layers

Layers:

- [Road Names](#) (0)
 - [Road Anno](#) (1)
 - [Default](#) (2)
- [Building Names](#) (3)
 - [Default](#) (4)
- [T Stops \(Large\)](#) (5)
- [T Stops \(Small\)](#) (6)
- [Landmarks](#) (7)
- [Walk](#) (8)
- [Buildings](#) (9)
- [Railroad](#) (10)
- [MajorRoads_Clip](#) (11)
- [Buildings_Other](#) (12)
- [Drop Shadow](#) (13)
- [Sport](#) (14)
- [Courtyards](#) (15)
- [Greenspace](#) (16)
- [Parking Lots](#) (17)
- [Fence](#) (18)
- [Blocks](#) (19)
- [Towns](#) (20)

Description:

New Whereis map

- http://maps.mit.edu/ArcGIS/rest/services/Base/WhereIs_Base/MapServer/export?bbox=-7914689.32099937%2C5214048.1193302%2C-7913475.60259068%2C5215026.03319228&bboxSR=&layers=&layerdefs=&size=&imageSR=&format=png24&transparent=false&dpi=&f=image



New Whereis map

- Uses caches from ArcGIS Server
- Google interface communicates with REST
- Uses Tiles for Google map
- Able to use these caches for other clients
 - ▶ Virtual Earth, 3D, etc

New Whereis map

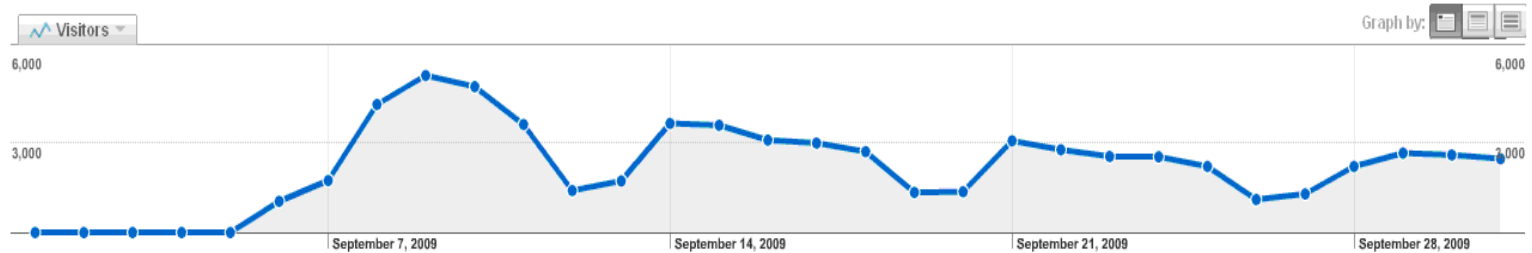
Whereis beta demo

Feedback

Export Email Add to Dashboard Beta Advanced Segments: All Visits

Visitors Overview

Sep 1, 2009 - Oct 1, 2009



47,776 people visited this site

78,318 Visits

47,776 Absolute Unique Visitors

95,950 Pageviews

1.23 Average Pageviews

00:00:46 Time on Site

85.71% Bounce Rate

60.99% New Visits

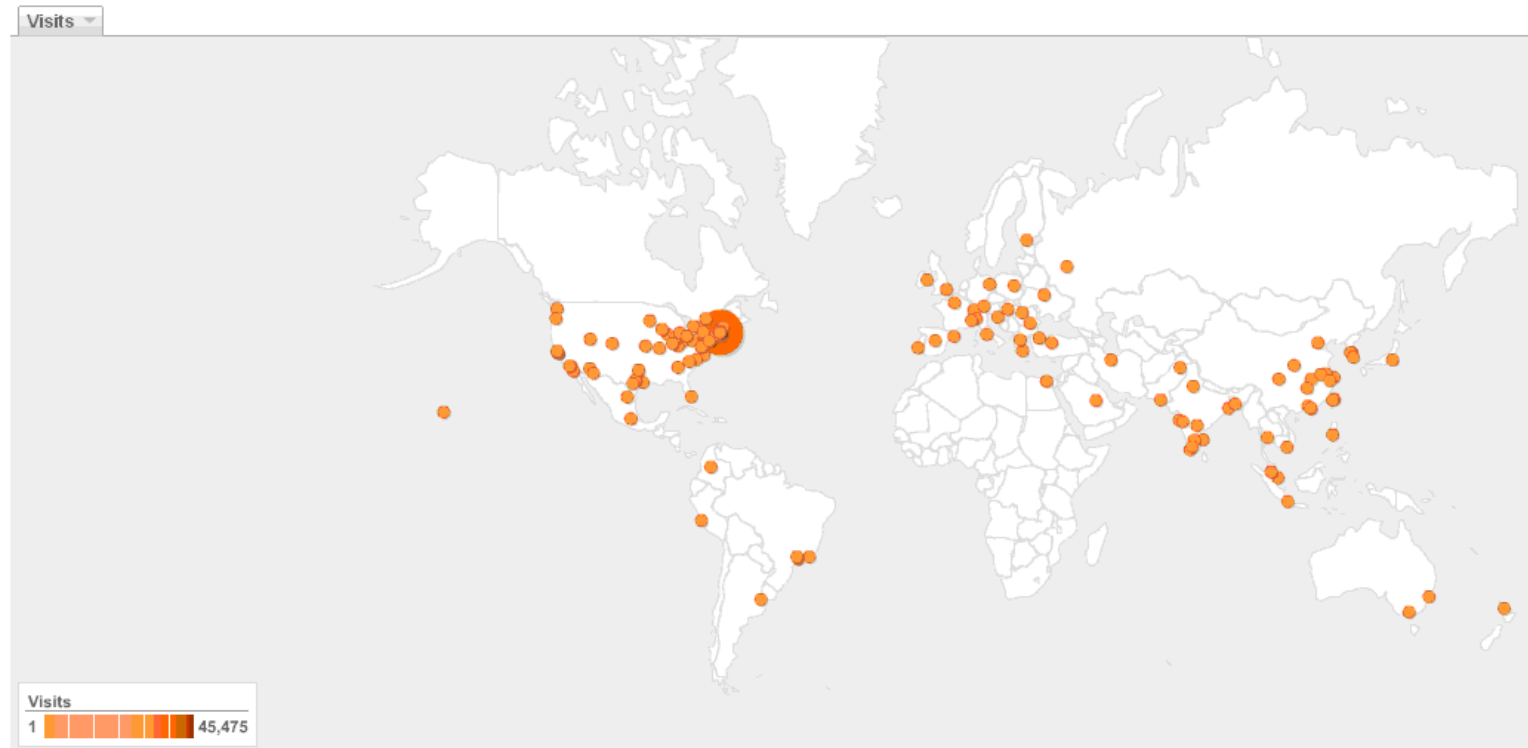
Visitor Segmentation

Visitors Profile: languages, network locations, user defined

☐ Browser Profile: browsers, operating systems, browser and operating systems, screen colors, screen resolutions, java support, Flash

Map Overlay
Geolocation visualization

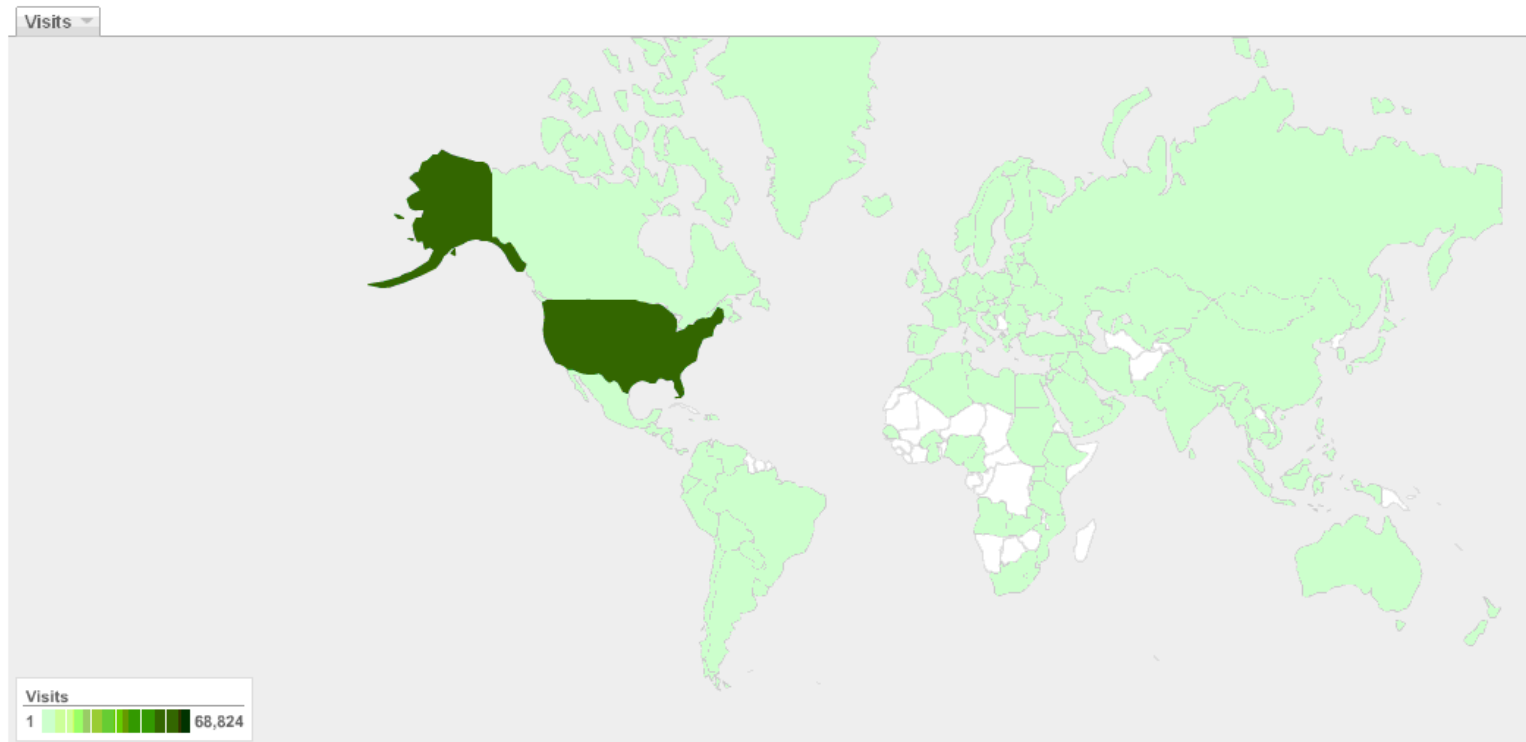
Feedback



78,318 visits came from 3,898 cities

Detail Level: [City](#) | [Country/Territory](#) | [Sub Continent Region](#) | [Continent](#) Dimension: [None](#)

Feedback



78,318 visits came from 142 countries/territories

Detail Level: [City](#) | [Country/Territory](#) | [Sub Continent Region](#) | [Continent](#) Dimension: [None](#) ▾

Feedback



Feedback



Feedback

- Let us know!

<http://whereis.mit.edu/>

campus-map@mit.edu

Future plans

- More information on map
 - ▶ Historic aerial photography
 - ▶ Historic buildings
 - ▶ Accessibility features
 - ▶ Blue lights
 - ▶ Live feeds
 - ▶ Geoprocessing, Network Tracing
- More clients
 - ▶ Bing Maps, Google Earth, Mobile

Thank you

 campus map

Search Map

Clear All Markers

Welcome to the MIT Campus Map

You can pan the map by dragging with your mouse. Building numbers are shown at higher zoom levels.

Other things you can do:

- Search the map, e.g.,
 - [visitor center](#)
 - [food](#)
 - [hotels](#)
- Find buildings and landmarks, e.g.,
 - [stata center](#)
 - [building 46](#)
 - [kresge](#)
 - [visitor parking](#)
- Click on any map location to get more information.
- Right click on individual location markers to remove them.

