

# Building the WorldWide Telescope

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## Abstract

This paper talks about the critical role that Jim Gray played in the creation of the WorldWide Telescope software. Contrary to what you might think it wasn't his database brilliance that made it happen, it was his generosity in sharing credit, inspiring, nurturing and connecting people, in this case that made it possible for the pieces to come into place and make it happen. Without Jim Gray's work with Alex Szalay on Sky Server and their ongoing support and encouragement, the software that is named in their honor would not exist today.

## 1. First Contact

Shortly after I had arrived at Microsoft Research in 1998 I heard that Jim Gray had won the Turing Award. I was humbled by the presence of people like Jim Gray and Gordon Bell who were at Microsoft Research. Gordon had seen some of work that I had done in the past and had gotten into the habit of stopping by my office to see what I was up to every few months or so when he would come to Redmond. In 2001 he brought Jim Gray to my office and I did a little show and tell about some current research and gave him copies of my earlier work that he was interested in. I was struck by his kind demeanor and genuine enthusiasm for the work.

In July 2001, Jim gave a talk at Microsoft called [Databases meet Astronomy](#), which was a revelation to me. In it he talked about astronomy was moving from an observational science to a computational science and how the Internet is going to be the world's best virtual observatory for science and education. Even more exciting to me was his last slide for the call to action: *"If you are a vis-person: we need you (and we know it)"*.

What Jim didn't know was that I have been thinking about building an interactive guide to the universe for years. The first concept prototype was built in 1986 and begun as a multimedia CD-ROM in 1993 called *John Dobson's Universe* at Continuum which was Bill Gate's "other" company. It was to be a story based interactive exploration of the Universe and we got to the concept prototype stage but it became clear that the technology just wasn't ready yet and the project was cancelled.

Jim's presentation was a wake up call that the data is coming online and the Universe project would be possible some time soon so in shortly after his talk, I sent him a PowerPoint presentation called *"Sky Server Virtual Telescope: an Extensible Rich Media Learning + the worlds largest telescope,"* to get him thinking about someday letting me work to extend SkyServer. Jim loved

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*Jim Gray Tribute*, May 31, 2008, Berkeley, CA, USA.

the idea but there were no resources for the project at that time and I was still too busy with other projects so it would have to wait.

## 2. SkyServer

By Fall of 2003 Sky Server DR 1 was a success and Jim asked me if I would help them redesign the website for the next release. Unfortunately I was still fully consumed with my research projects but I definitely wanted to do something just so I could still be involved somehow with him on SkyServer. I worked with my designer Asta and together we designed the layout, look and feel for the site in a few days and sent that off to Alex Szalay at Johns Hopkins. It was simple piece of work that was just to let Jim know that I still wanted to do the Universe project with him someday soon.

## 3. Extreme Credit Sharing

Alex Szalay and his team at Johns Hopkins quickly implemented the design changes and the New SkyServer DR2 site was launched and traffic was up. Jim sent this note to me:

*"The new edition of SkyServer is public at <http://skyserver.sdss.org/> using your design. It is a very nice layout and packs a lot of information into a very compact area. Thank you VERY much for your guidance and design.*

*Jim*

*PS: I attach a press-pass story released today that mentions your and my contributions to SkyServer."*

I thanked him for the email and said it was really was nothing compared to the work that he, Alex and others had done on the site and that I still really wanted to work on the Universe project with him if I could ever get the time and resources. Jim continued to mention our contribution when he talked about SkyServer. It amazed me how generous he was about sharing credit no matter how small (or insignificant) that contribution was. It was just an honor be associated with something that he worked on.

## 4. Catalyst

Finding time to work on the Universe project was tough as other projects took precedence but when Jim was in Redmond, he would drop by just to see how I was doing, bounce an idea off me, or connect me with someone else inside or outside Microsoft doing something interesting where we could help each other.

Jim knew the Universe project was always in the back of my mind and early in 2005 he and Alex suggested that I give a talk about the Universe project at [The Visualization of Astrophysical Data: Bringing together Science, Art and Education workshop](#) hosted by Randy Landsberg at the University of Chicago's Kavli Institute for Cosmological Physics. The prospect of talking to this group of astrophysicists and astronomers was totally intimidating but Alex and Jim were confident (unlike me) and reassured me that

this group would be receptive. After the workshop Jim sent me this message:

*Ataboy! My sources tell me your presentation and presence at the workshop last week was SPECTACULAR SUCCESS.  
Thanks and congratulations.  
Hope you had fun.  
Jim*

The workshop turned out to be the perfect audience for the Universe project with a mix of education/public outreach folks and astronomers and astrophysicists who really liked what I was proposing for the Universe project and wanted to help me any way they could. Alyssa Goodman from Harvard Center for Astrophysics was particularly supportive and invited me to come to CfA and talk about the Universe project and engage with other astronomers there. Eureka! We had a beginning!

## 5. Connector

By 2006 I was able to hire Jonathan Fay who is a talented software engineer, amateur astronomer and well known in the amateur community. He had also worked on TeraServer with Tom Barclay and seemed to have the perfect background to build the Universe project. There was another collaborative research project we had to finish but by Fall of 2006 we had blocked out the time to finally start work in earnest on the Universe Project. Jonathan was able to complete a rendering engine for the Sloan data and by the end of the year it would easily support a 9 megapixel multiple monitor array that ran large field SDSS images of the sky. After seeing it, Jim would email lots of people within the company to encourage them to take a look with comments like this: *"Guys, this is a KNOCK YOUR SOCKS OFF demo. You should see it!"*

In January of 2007 things were moving, and Alyssa Goodman who I had met at Randy's AstroViz workshop found Jina Suh, a great intern from Harvard Center for Astrophysics to help us start work on the data pipeline. On January 18<sup>th</sup> I sent Jim a project update on new details for the design, information architecture, functionality and content and he was super excited about the new vision for the project. In the days after that he sent back an enthusiastic response *"Curtis: This is exciting news. GREAT!!"* followed by other thoughts related to the project, connections to other people I should talk to from his work with other telescopes and how he'd be glad to facilitate the start of those discussions....

## 6. The WorldWide Telescope

It was early March of 2007 and there was still no word of what happened to Jim. We were preparing the demo of the Universe

project and we had heard that it was going to be included in Rick Rashid's keynote for the opening of Techfest 2007. Jonathan and I decided to rename the Universe project to be the WorldWide Telescope to honor our missing friend and colleague.

## 7. Inspiration as legacy

Since Techfest 2007, our tiny team has grown with some support from management and the generosity of a number of people to help us in addition to their normal day jobs just because they believe in WWT.

The goal of the WorldWide Telescope is to inspire people to create and share their knowledge about the Universe with people everywhere. We wanted to make that process of exploration and discovery to be an effortless and wonderful experience that you return to again and again.

These goals sound remarkably similar to the example that Jim set for others and could be a fitting tribute and legacy for all that he has done for so many people.

Those of us who have worked on WorldWide Telescope all know that we are extremely lucky to be part of something this special.

The real tribute to Jim Gray is not this paper but the software named in his honor that we hope will go out into the world and inspire others as he did with so many of us.

## 8. Acknowledgement

I would like to thank Jim Gray for his inspiration, encouragement, support, introductions, his friendship and generosity towards me and making it possible to do this project of a lifetime.

## 9. References

[Gray] <http://research.microsoft.com/~Gray/>

[Singh, Gray] [SkyServer Traffic Report – The First Five Years](http://research.microsoft.com/research/pubs/view.aspx?type=Technical%20Report&id=1236)  
<http://research.microsoft.com/research/pubs/view.aspx?type=Technical%20Report&id=1236>

[Gray] [Databases meet Astronomy](http://research.microsoft.com/~Gray/talks/Databases_Meet_Astronomy_Redmond.ppt), Microsoft in Redmond  
[http://research.microsoft.com/~Gray/talks/Databases\\_Meet\\_Astronomy\\_Redmond.ppt](http://research.microsoft.com/~Gray/talks/Databases_Meet_Astronomy_Redmond.ppt)

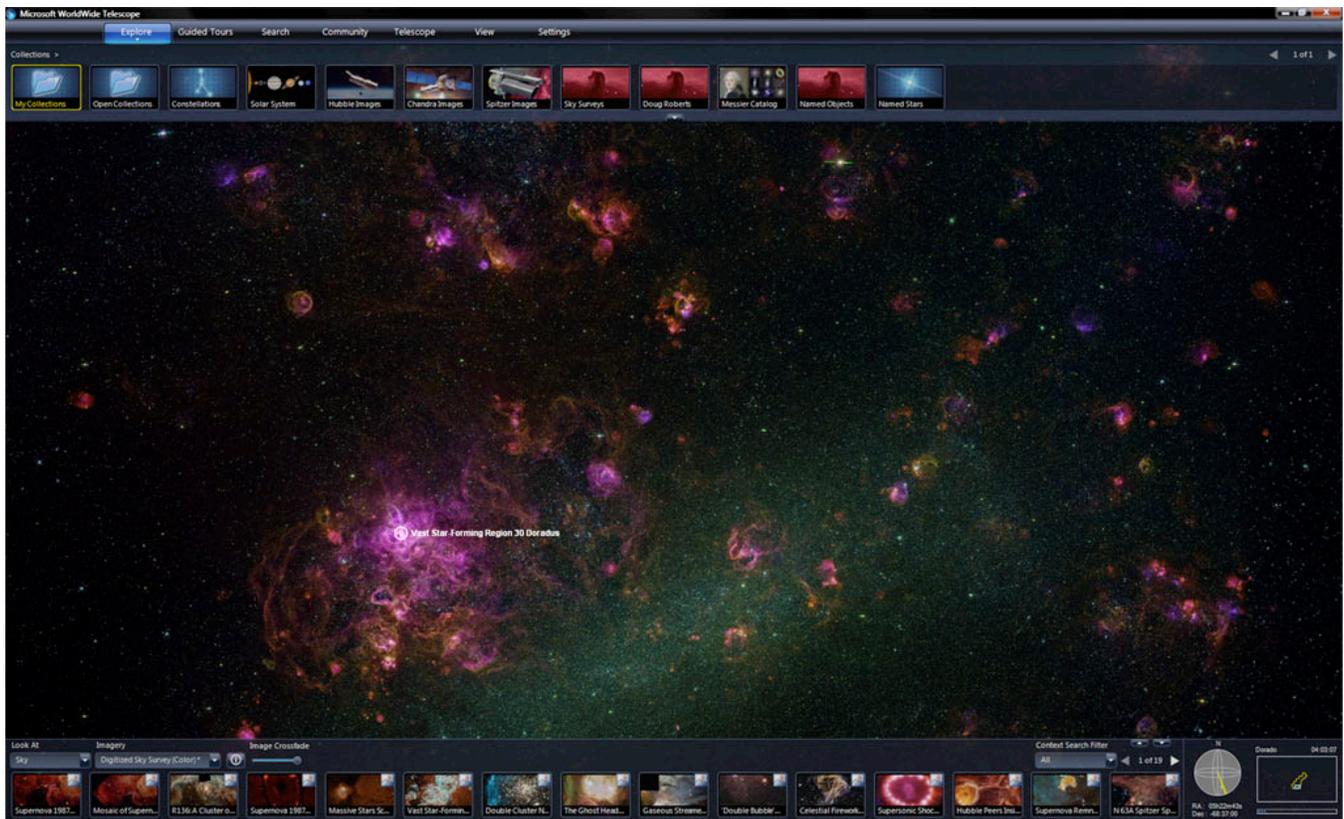
[Barclay] T. Barclay, D.R. Slutz, J. Gray, "TerraServer: A Spatial Data Warehouse," Proc. ACM SIGMOD 2000, pp: 307-318, June 2000

[Landsberg] [The Visualization of Astrophysical Data:  
Bringing together Science, Art and Education](http://kicp-workshops.uchicago.edu/visualization2005/)

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Multiwavelength survey browsing (30 Doradus – NOAO/NSF)



High resolution image surveys (Space Telescope Science Institute/ESA)