Squeaking By... with Alan Kay

By Davor Cubranic

Alan Kay, VP and Disney Fellow, Walt Disney Imagineering, opened his keynote address on Thursday by placing the current state of software engineering in the historical context of architecture. While we might not take decades of work by thousands of slaves to build our systems as the ancient Egyptians did for the pyramids, as the comparison went, the software engineering profession still has a ways to go before it can turn out the system as complex (and stable in its first version!) as the Empire State Building in the mere 22 months that it took to design and build the original. What is needed now is a combination of power tools and powerful ideas.

At the root of the problem, Kay claims, is that we are still not using the computer to its fullest potential. In this, the computer is in many ways going through the same growing pains that the printing press underwent in the first several decades after its invention in the 15th century. Printed books were then seen as simply another form of manuscripts, much like the computer today is seen as another, although slightly better, form of paper, and it took nearly two centuries before the ready availability and affordability of printed books brought about the revolution in thinking in the 17th and 18th century.

ICSE Awards

By Michael Wing

Numerous Awards were handed out Thursday morning.

The IEEE and SEI gave Software Process Achievement Awards to two companies. The award to the AIS Development Group, Advanced Information Systems, Inc., Peoria, Illinois was accepted by Pat Ferguson and Prasad Perini. The award to the Test Software and Industrial Automation Branches, Oklahoma City Air Logistics Center, Tinker AFB, Oklahoma, was accepted by Walter Lipke and Kelley Butler. To win this award, organizations must make significant, sustained, data-based, and impacting efforts that go beyond their own organization.

The IEEE made R.K. Shyamasendar a Fellow for his “contributions to logic programming.” He is currently Dean at the School of Technology and Computer Science, Tata Institute of Fundamental Research.

The ACM announced that Phillip Davis Stonybrook, John Gannon, University of Maryland, Mary Lou Soffa, University of Pittsburgh, Carlo Ghezzi, Politecnico di Milano, and Koji Torii, NAIST, all members of SIGSOFT, were made Fellows.

ACM SIGSOFT gave their Distinguished Service Award to Bill Riddle.

The ACM SIGSOFT Outstanding Research Award went to Niklaus Wirth, who was unable to attend, and to Harlan Mills, posthumously.

The Best Paper of ICSE 11 was given to Dwayne Perry for his work on Inscape titled, “Software Evolution and ‘Light’ Semantics.” Dr. Perry gave a talk, describing two kinds of complexity, and then arguing that light semantics can help. Light semantics lie in between type checking and full

(Continued on page 3)

By Karl Reed

The last twelve months has seen a virtual explosion of activity internationally aimed at clarifying the status and nature of Software Engineering. Debate has ensued as never before. In the US, there has been a flurry of activity around the development of undergraduate software engineering degrees (where the US has been lagging compared to other countries), and on the possible formal licensing and certification of Software Engineers. For example, the Texas Board of Professional Engineers has decided to require Software Engineers to be licensed. In addition, ABET is now accrediting Software Engineering degrees.

Certainly, these events stimulated the formation of SWECC. However, organized efforts to deal with this issue are far from recent. The IEEE-Computer Society and the ACM, as the two US based professional societies with international reach, established a Joint Steering Committee for the Establishment of Software Engineering as a Profession. This adopted four initial recommendations; (1) adopt standard definitions, (2) define the required body of knowledge and recommended practices, (3) define ethical standards (4) define curriculum and related issues for Software Engineering. In addition, there have been discussions and moves in other countries, which pre-date even these initiatives. Some would argue that the initial moves to create “Software Engineering” more than 30 years ago were in fact the first steps. What we see now is the largest professional societies in our field putting their weight behind the broader effort.

At the end of 1998, this collaboration was formalized by the two bodies as the Software Engineering Coordinating Committee (SWECC). This now consists of Leonard Tripp (Chair, and President, IEEE-CS), Dennis Frailey (Vice-Chair, ACM), Mark Ardis (ACM-SIGSOFT) Doris Carver (IEEE-CS Immediate Past Chairman), Linda Northrup (ACM Education), Karl Reed (IEEE-CS TCSE).

The Ethics project is regarded as complete. Currently, the Software Engineering Body of Knowledge (SWEBOK) project is well advanced, and the Software Engineering Education Project (SWEEP) is being started. The SWEBOK project is being carried out by a team (under contract) at the University of Quebec at Montreal led by Pierre Bourque. The results of its work (essentially summaries of topics with lists of source material), are reviewed by, and produced under the guidance of an Industrial Advisory Committee of ten industry representatives, whose companies are assisting with the funding of the project. A Panel of Experts will be involved in reviewing these results, which will eventually be passed to a series of Review Teams for final adjustments. Actual SWEBOK Knowledge Area entries are to be produced by a relevant expert in the area. A traditional two-stage (Strawman - Stoneman) process is involved.

The SWEEP (education) task force is drawn from the original participants of the former education task force. The Co-Chairs are Gerald L. Engel and Richard LeBlanc, and the other members Bruce H. Barnes, Martin Griss, Tony Wasserman and Laurie Werth.

The SWECC is conscious of the fact that there is a very large community of researchers and educators that have created the Software Engineering field. It is intended that this community will become intimately involved with SEWBOK as the source of the Panel of Experts (which Mark Ardis and myself are constructing), and the Review Teams. The primary source of these groups will be the membership of both ACM-SigSOFT and the Technical Council on Software Engineering of the IEEE-CS, plus other sources. Of special concern has been the need of guaranteeing that there is appropriate industry input to this process, and the outcomes reflect practice as well as theory.

ICSE is arguably the largest and most significant international gathering of the software engineering community. Consequently, we seek input and involvement from the members of this community.

Further details can be found on our web-sites http://www.computer.org/tab/swecc or http://www.acm.org/serving/se and email inquiries can be addressed to any of..

Leonard.Tripp@PSS.Boeing.com
"Ardis, Mark" maa@research.bell-labs.com
"Carver, Doris" d.carver@computer.org
"Frailey, Dennis" d-frailey@ti.com
"Northrup, Linda" lmn@sei.cmu.edu
"Reed, Karl" k.reed@computer.org

Karl Reed, Member, IEEE-CS/ACM SWECC

Note There will be workshops on SWEBOK AND on the Future and Nature of Software Engineering at the STEP99 being held in conjunction with the SEI Symposium, August 30 - September 2, 1999 in Pittsburgh, (web-page http://www.iwcase.org/step99/)

Wanted

WOW is looking for an enthusiastic bunch of editors and reporters to take on the mantle of producing the newsletter for future ICSEs.

Contact Will Tracz for more on this.
ICSE Posters

By Michael Wing

The ICSE Poster Session was open from 10 to 4 on Wednesday and Thursday. It featured 18 posters, out of 26 submissions, although not everyone showed up. Participants were asked to be present, whenever there was food. According to Debora Brodbeck, the poster session has gone very well.

The simple U-shaped floor layout made it easy for everyone to walk around and browse both the posters and demos. Putting the posters near the food brought lots of people by.

I won’t list the exhibits, because they are described in the proceedings. Presenters came from Chile, Canada, and Japan, as well from LA. Many who presented formal demos in other sessions also had demos in the poster area.

I asked Debora Brodbeck, who helped put the exhibit together, if she had any words of advice for presenters. She urged anyone who thinks that they might, to “just do it.” She said that if you don’t have time to finish a paper, consider giving a poster instead. And, if you finish your project, it is easy to upgrade a poster into a demo. Posters are a great way to meet people.

She said that many people asked at the last minute if they could give a demo. But, since the poster session is refereed, last minute additions are not possible.

Squeaking by…

(Continued from page 1)

One would hope computers would not take quite as long before they bring the now long-promised computer revolution. Kay shared some of his idea on what could be done through a brief overview of his research experience spanning the last 30-odd years. One of the underlying themes, from the first contacts with Simula and Ivar Sutherland’s Sketchpad system in the 60’s through Smalltalk at Xerox PARC and afterwards, was object-oriented programming. (Although the term itself has been misappropriated and diluted – what Kay originally wanted to capture with it was the move away from seeing the computer as a clockwork and instead view it as a biological system similar to DNA in the living cells.)

Another theme, influenced by Seymour Papert’s work on LOGO, was the notion of involving children with computers from a very early age. Why, Kay questioned, do we still teach them the old-style curriculum when, in the words of Maria Montessori, children are set up by nature to learn the place in which they play. Why not instead let them play and learn with computers in entirely new ways? One of the important factors of progress is being born into a powerful culture, and we need to take advantage of this opportunity that is given to our children today. This may eventually bring entirely new ways to communicate, work, think, and live. A good historical example is the USA: it was a political system that was invented, in an open forum, using the contemporary scientific ideas, and the Federalist papers are still an excellent example of “systems papers” and a worthwhile read even today.

One important way to facilitate this, Kay said, is by allowing multiple levels of authoring in our computer tools, so that we may accommodate users ranging from complete novices to experts. Another is by creating new media that will employ the capabilities of computers, our “dynabooks”, and “create the needs only they can fill”.

Bill Riddle receives award

Dewayne Perry’s Award

Perry bags the ICSE –10 award

ICSE Awards

(Continued from page 1)

theorem proving. (Lee Osterweil proposed at the ICSE 11, that the organizing committee give an award to the most significant paper from ten years prior. Barry Boehm recommended this be changed to the most significant paper from 10 conferences prior, because at the time, conferences were held every 18 months.)
IEEE Computer Society
Top Ten Selling Titles at ICSE ’99
7. SPICE: Software Process improvement and Capability Determination, El Emam/Drouin/Melo (eds)

For more information, see the Online Catalog at http://computer.org

Springer
Top 5 Books at Springer
1. Writing for Computer Science, Zobel
2. Software Engineering with Reusable Components, Sametinger.
4. Requirements Engineering, Macaulay.
5. The Politics of Usability, Trenner/Bawa.

Addison-Wesley
The Top Ten Best Sellers
1. The Mythical Man Month, Fred Brooks
2. Cleanroom Software Engineering Stacy Prevell, Carmen Trammell, Richard Linger, and Jesse Poore
3. Applying Use Cases, Gert Schneider and Jason Winters
4. Software Project Management, Walker Royce

Klywer
Klywer Academic Publishers distributed over 50 copies of Empirical Software Engineering, An International Journal, individual subscription price $60.00. Automated Software Engineering came in next with over 40 copies distributed. A new publication now in its 2nd volume ranked third, Autonomous Agents & Multi-Agent Systems Software Quality Journal were also in demand.

Sharon.palleschi@wkap.com

The PITAC Software Challenge

By David Coppit

Michael Evangelist of the NSF presented his views on the PITAC challenge in the form of a “Top 10 Rumors” list. While humorous, the message was clear: software is a crucial element of the future of information technology, and software engineering researchers should begin preparing innovative proposals that provide a clear validation approach and a consistent framework in which to do that evaluation. He stressed that he was “guardedly optimistic” that funding would be appropriated by Congress.

Evangelist warned that despite the clear recognition of the importance of software, there are a number of threats to the community. In particular, he recommended that the leaders of the software community be more vocal about the progress of software engineering research in order to combat the skepticism held by some outsiders. He also encouraged interdisciplinary proposals, despite projects that are now presenting themselves as software-related in response to the PITAC report.

In his summary, Evangelist encouraged the submission of innovative proposals that include clear validation methods. He encouraged the publication of articles to publicize software engineering achievements, as well as articles and letters explaining the PITAC concerns as related to engineering. Finally, he encouraged the community to support IT² and related initiatives.

John Salasin presented an overview of challenges facing DARPA/ISO. A number of these centered around scalable, robust, and interoperable systems. "Dynamic interoperability" is an important paradigm in need of more research, he said. The Information Systems Office is also interested in architectures supporting easier integration, attack prevention, detection, and response.

One theme in Salasin’s presentation was the need to replace ad hoc methods with predictable, engineered techniques. He cited the need for adaptable systems with reliable upgrading, and continuous evaluation of the system for correctness. Likewise, he asked for tolerant systems that could handle non-critical variations in the system’s

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Looking Ahead _
Limerick 2000

The following is a brief interview with ICSE 2000 general chair Carlo Ghezzi and program co-chair, Mehdi Jazayeri

Q. What are the goals of ICSE 2000?

A. We would like to make ICSE 2000 a memorable conference for the millennium by consolidating the role of ICSE as "the" meeting point for researchers in software engineering and as a forum for cross-fertilization between research and practice.

Q. What do you think will make ICSE 2000 different than other ICSEs?

A. Besides being in Ireland, the opportunity to look back to see if, where, and why we are still there after the turn of the new millennium. Where failures occurred, why; where we did not fail, and why. And, most importantly, which were the main lessons we learned.

Q. What words of advice do you have for potential authors/attendees?

A. Submit a paper, attend the conference, and plan to spend a vacation in Ireland.

You will be surprised by the hospitality of the people, the beauty of the land.

Wanted:
Thesis advisor with plenty of extra time to help students write programs.

Contact WOW for more information.

Sketch of Limerick
By Kevin Ryan

As ICSE 99 draws to a close, the spotlight shifts from LA to Limerick – the city in the west of Ireland where the Millenium ICSE will be held in June of next year. Not everyone has heard of the city of Limerick, although most people will know what a 'limerick' is - a 5 line nonsense verse with a strict meter and rhyming scheme. In much the same way as the Earl of Sandwich, in his need to eat while gambling, invented the food item that bears his name, so, it is believed, the Earl of Limerick required his dinner guests to compose impromptu verses in return for his hospitality.

ICSE2000 will not force its delegates to compose rhymes - but we hope they will be inspired by the ambiance of a city that goes back almost 1,000 years. Although originally a Viking settlement, the oldest surviving buildings are the substantial, riverside King John's castle and the twelfth century St. Mary's cathedral. There are a few scattered remnants of the city walls and a small but impressive Georgian quarter. Nowadays the city is the center of a prosperous region, where a thriving IT sector supports an enjoyable lifestyle, centered around food, drink, traditional music and sport of every variety - rugby, hurling, golf, sailing etc. Limerick has the added benefit of being within a short drive of much of Ireland's best scenery and is served by Shannon Airport. Fortunately, Aer Lingus, Ireland's national carrier, will shortly open a direct service from LA - to add to those from Chicago, New York and Boston. Add to this the services through Dublin - just 3 hours from Limerick - and there should be ample travel connections for everyone coming to share in the special experience that will be ICSE 2000.

ICSE 2001
By Hausi A. Müller

ICSE 2001 will be held at the Westin Harbour Castle Hotel in Toronto, Ontario, Canada, May 12-19, 2001.

Today, the engineering of software profoundly impacts world economics. Prominent software failures and widespread changes, such as the Year 2000 problem and the European currency change, demonstrate how much the world economy depends on software. ICSE 2001 will review what we have learned from these experiences and, in particular, how we can prepare for future, mass changes involving diverse software systems. For example, the software industry is implementing mass changes to use Internet technology to streamline the way businesses gather and distribute information. Furthermore, because the increased popularity of the Internet has brought electronic commerce to small businesses and individual consumers, the software industry is working to adapt both legacy and new applications to a network-centric environment. These changes involve exploiting Web-based user interfaces, component-based systems, and distributed cooperative information systems. Some of these changes, such as those that provide solutions to the Year 2000 problem, have fixed deadlines. However, minimizing time to market is critical for all businesses. These, and other events on the horizon that are equally vital to the survival of large and small businesses, make it imperative that the software engineering community develop infrastructures, methods, and tools to help effect mass software change.

We invite you to participate in ICSE 2001 to help us build an exciting forum for exchanging ideas and experiences in this ever expanding and critical field of software engineering.

For more information refer to our Web site: http://www.csr.uvic.ca/icse2001/
Upcoming Events

**ISSTA-2000**, the International Symposium on Software Testing and Analysis, and the 3rd Formal Methods in Software Practice (FMSP) will be held August 21 - 25, 2000 at the downtown Portland Marriott, Portland, Oregon, USA.

You are invited to come join researchers and practitioners in a forum to discuss and evaluate foundations, technology, and experience in software testing and analysis along with formal methods in practice.


General Chair: Debra Richardson, University of California, Irvine (djr@ics.uci.edu) ISSTA Program Chair: Mary Jean Harrold, Ohio State University (harrold@cis.ohio-state.edu) FMSP Program Chair: Mats Heimdahl, University of Minnesota (heimdahl@cs.umn.edu)

For further information: www.ics.uci.edu/IRUS/isssta. Sponsored by ACM SIGSoft

The 8th International Symposium on the Foundations of Software Engineering (FSE/SIGSOFT-2000) and the 10th International Workshop on Software Specification and Design (IWSSD) will be held November 5-10, 2000 at the Shelter Pointe Hotel and Marina, Shelter Island, San Diego, CA, USA.

SIGSoft Tutorials: Monday - Tuesday, November 6-7. 8th FSE: Wednesday – Friday, November 8-10. General Chair: John Knight, University of Virginia (jck@cs.virginia.edu)

FSE Program Chair: David Rosenblum, University of California, Irvine (djr@ics.uci.edu)


**10th International Workshop on Software Specification and Design**

Does the new millennium hold any prospect for the field of software specification and design? Will the field contribute anything substantial to the practice of software engineering? Is there any benefit to investigating methods, tools, and formalisms for specifying and designing complex systems? Is there reason to bring together researchers in requirements, design, software architecture, formal methods, distributed and real-time systems? Is there a vital purpose to using early lifecycle system abstractions for quality verification and validation, behavior prediction, quantitative evaluation?

We think so ... come and find out

10th IWSSD: Sunday (afternoon) – Tuesday, November 5-7. Program Co-Chairs: Debra Richardson, Paola Inverardi Universitá dell’Aquila, Italy (inverard@univaq.it)

For further information: www.ics.uci.edu/IRUS/iwssd. Sponsored by IEEE

The PITAC ...

(Continued from page 4)

behavior. Too many times, he said, systems are delivered that are perfect but too late.

During the questions session, participants made clear that the time to be vocal in supporting the PITAC report and the IT² initiative is now. There was some concern that the PITAC report's emphasis on the economic benefits of information technology would force fundamental software engineering research to justify themselves in terms of short term economic benefit. Both Salasin and Evangelist replied that the problem is that many proposals that they see do not clearly describe the problem being addressed, and often fail to provide any evaluation at all.

Perry’s Award

Q. How do you feel about the award?
A. I am obviously delighted. The award has been one of the important aspects of ICSE since it was introduced at ICSE 11. It is very satisfying to be on the receiving end where before it was my pleasure to be on the awarding side.

Q. Would you do anything differently?
A. One of the frustrating things was the lack of interest in using interface specifications. Instead of unsuccessfully trying to get a project to do the extra work and create Inscape specifications, I would now do them myself in partnering with development. The downside is that is a lot of work learning the specific domain and system but I think that this is the only way to do it successfully.

Q. Would your project have been any different if it had been done as an academic project instead of an industrial research project?
A. Yes, it would have been quite different: I would have had a project organization (much like the Gandalf project at CMU) which had students apprenticing in implementing parts of it and then carving out an area for a thesis. The research was rich enough to support this, it was then at Bell Labs Research, the paradigm was one researcher, one project. So I did much of the programming of the Inscape prototype myself.

The one exception was the specification-based retrieval part (Inquire) that was implemented by Steve Ponovich in the summer of 1989. These limitations resulted in getting less done than I would have liked and in my focusing more on architectural and design issues than on prototype/implementation issues.

And the runner-up is ...

This late breaking submission to the ICSE Energizer Bunny Award (i.e., they keep going, and going) is Lee Osterweil, tied for 3rd place. Lee missed ICSE 3, when his daughter was being born, and ICSE 4 when his house was being born.
Finally your intrepid WOW reporter catches up to the other man behind the scenes..

An interview with Local Arrangements Chair Hal Hart.

Q. Inquiring minds want to know, what's it like on the volunteer side of running a big conference?
A. Corbin Ball, our professional meeting planner contractor, said it right in Tuesday’s issue: it all begins with AV, registration, & catering, and then mix in attention to detail & people skills. But there’s more -- ICSE’s volunteer organizers leverage the pro’s capabilities to create a great event. I liken it to the “domain-specific software architectures” paradigm -- Corbin provides the “reference architecture” for a large conference reflecting the “conference domain knowledge”, and we volunteers instantiate it with our ICSE “application engineering” to define this event. For example, PC Co-chairs David Garlan and Jeff Kramer, Tutorials Chair Kevin Ryan, Workshops Chair Wilhelm Schäffer, and numerous others provide the end-user components (the technical program) of the system, with no small assist blending it all from Barry. I guess I provide the “glue code.” (I hate that term. Maybe I should say I refine all the interfaces to make everything work together.)

Q. What did you do to make things work right that didn’t work as planned?
A. My only semi-original thought here is to know when to reverse the “delegate” guideline. Sometimes hiccups are best and quickest solved by just taking care of them yourself on the spot: design a form, ghost write an email that needs to be broadcast, make the repro run yourself, set up the spreadsheets the way you want them (Corbin is great at this!), make decisions on shirt specs when consensus isn’t emerging, threaten to finish a publicity piece when the graphics designer or a key author wants to miss a schedule, make and post those BOF signs yourself, etc. The really needed skill is judging how to prioritize conflicting requests and being able to quickly assess whether delegation or just doing it (or ignoring it) is the optimum -- just like in our real jobs. Of course, this is not a precise science, and expecting to make everyone 100% happy is unrealistic. But I do believe firmly in, and I hope I usually practice, Win-Win.

Q. What “surprises” did you have?
A. VGA/data projector requests! We expected a few of the tutorial presenters and none of the workshop participants to need them, and we got many requests from both camps. Too many at the last minute. Oh well, a valuable lesson learned for the future: ICSE must plan and budget for a lot more than 4 data projectors. Fortunately, Moore’s law seems to apply here too: the cost of those things has really come down in the past 2 years and the quality has increased to usually exceed the effect of vugraphs.

Q. Any ICSE 99 final numbers?
A. 861 heads, give or take delta. Don’t ask for a break-down now. Maybe week after next.

Q. How much effort went into the preparation for ICSE?
A. I enjoy generous support from TRW for professional society activities (15-25% of my time in most years), and I really stretched that since the start of 1998. (Of course, I’m also chairing SIGAda’s annual conference in Redondo Beach in October, so ICSE’s not the sole blame. Corbin mentioned 8000 emails about ICSE, I think that’s about right for me too. Of course, it seems like Corbin & I exchanged 4000 of those.

Q. Any closing thoughts?
A. Believe it or not, this was my first ICSE. (I’ll never catch Marv!) I know so many of the principals here and have been at so many events with them in the past, that I’ve been dying for a good excuse to attend ICSE for over a decade. Thanks to Barry for providing that excuse when he invited me to be Local Arrangement Chair and Treasurer 2 and a half years ago (the 4th of 5th time he and I have worked together like this -- after all, he was my mentor at TRW until he moved on in 1989). What I really like about ICSE is how it serves as a valuable federation of co-located, co-facilitated events (albeit seriously complicating Corbin’s and my jobs). Something for everyone and every purpose. My experience organizing smaller events (several < 100 attendees) isn’t accidental. I get my jollies participating personally in the smaller, work-oriented settings, especially workshops and BOFs, where real collaborations often produce useful “products” in a day or two. My heart and my main attention have really been with looking after the needs of the workshop and tutorials. Anyway, my last thought is that ICSE’s diversity of offerings has as a subplot the synergy and productivity gained by exploiting and mixing the different planning contributions of professionals with SIGSOFT’s and TCSE’s volunteers.
The Old is New

By Michael Walsh

According to an Associated Press report published in the morning Los Angeles Daily News companies have found a new market for computers. Only one out of four people over 60 own computers and they are out to change that. People over age 50 are the second-fastest-growing group on the Internet, trailing only the 16-24 year-olds according to a Nielsen study.

The companies involved? The usual suspects: Microsoft, AOL, Intel and IBM. AOL is forming partnerships with groups such as the American Association of Retired Persons. So “old” is now new as major companies are trying to find a target group other than aging computer professionals.

On another page of the newspaper is an article titled “Denny’s to acquire new 1950’s diner look”. This supposedly is an appeal to younger consumers who have shown an interest in retro styles and music such as swing. This leads me to the suspicion that society could be heading backward. I hope it doesn’t also mean we end up with our old computers.

Trivia

By Michael Walsh

Radio News Report

Burger King is providing (at least at one restaurant) 15 minutes of Internet browsing with a meal order. Sorry – No email access.

Quote from Aviation Week

General Richard B. Myers, Commander of the U.S. Space Command with reference to countering sophisticated attacks against Pentagon computers:

We understand that we’re not the experts in this. We’ll rely on a lot of outsider help, such as contractors and “gray beards” who have experience with network protection.

Architecture Description Poems

Submitted by David Garlan

The next step in the evolution of Architecture Description Languages is Architecture Description Poems. The following poems express three styles.

Freeform Style:

The architecture, oh so fine
Is in the main a pure pipeline
Augmented by a database
That holds persistent state in place
Pipes and filters alternate
Each filter works at its own rate

Haiku Style:

Module floating free
Unconnected, waiting, blocked
An event happens.

Limerick Style:

An architect humble, named Snipes
Was sick of his manager’s gripes
To get the appearance
Of greater coherence
He specified filters and pipes.

And from the line you may it pluck
But if types don’t match you’re out of luck
And, of course, semantics must
Or else the output will be a bust
Yet universal this must be
The price of modularity
So that is why we chose this time
To compute with a near pipeline

Tim Mayer, Xerox

And in anticipation of ICSE 2000,

Quote of the Day

Reality is a mere illusion, albeit a persistent one.

A. Einstein.