

Kenneth Nagin

Role

Computer Science Researcher and Designer

Experience

IBM Israel – Haifa
Research Lab

IBM Research 2011-2014

Software Defined Manufacturing – researcher, lead designer and co-architect

Manufacturing becomes programmable end-to-end across the entire value chain: starting from sourcing of the suppliers of designs, parts, and raw materials; to electronically submitting orders that can be automatically processed on the manufacturer side; to assembly; and to reconfiguration of supply chain relationships on demand. Future manufacturing will be software defined, implying a rich ecosystem of services, systems, manufacturing machines, interconnected into a global manufacturing fabric analogous to how information services are interconnected today on the Internet. Collectively, these services will facilitate Software Defined Supply Chains, opening up a plethora of new business opportunities. My group focuses on developing a robust, cost efficient, secure, and extensible cloud based Manufacturing as a Service (MaaS) ICT platform for B2B collaborative manufacturing. We build upon recent advances in Factories of the Future and take them to the next level of performance, security, dependability, and cost-efficiency. We put an emphasis on integrating Additive Manufacturing (AM) technologies that allow efficient and sustainable use of materials for building complex geometries, with the rest of the manufacturing ecosystem by means of IoT and Cloud.



| Traditional IBM Customers | |
|--|-------------------------------|
| Gains: "Continuous Product Innovation" | |
| 1 | Extend capacity with no CAPEX |
| 2 | Agile supply chains |
| 3 | Regional customization |
| 4 | New markets |

| Manufacturing Startup\$ | |
|------------------------------------|-------------------------------------|
| Gains: "Global Presence/low CAPEX" | |
| 1 | Immediate global presence |
| 2 | Little CAPEX |
| 3 | Extended manufacturing capabilities |
| 4 | Time to market; IP Protection |

ENSURE <http://ensure-fp7-plone.fe.up.pt/site/> is a research project

partially supported by the European Community's Seventh Framework Programmer. Ensure's goal is to significantly extend the state of the art in digital preservation which to-date has focused on relatively homogeneous cultural heritage data to create an economically viable solution suitable for various commercial institutions like health care and finance. I am a member of the PDS Cloud team that is designing the component to handle Ensure's actual storage requirements. PDS Cloud is a continuation of our work related to preservation digital store <https://www.research.ibm.com/haifa/projects/storage/datastores/index.html>. PDS Cloud's research goals are to leverage the storage cloud for archiving and support a synergy between storage and compute clouds. I was a member of the storlet design and implementation team. We leveraged storlets to move computation function closer to physical storage to process data on the storage cloud more efficiently. I was responsible for designing and implementing Java sub-components to provide transparent access to various cloud vendors and leveraging virtual appliances running on the compute cloud to support archival tasks related to cloud storage access, interpretation and transformation. Transparent access to various cloud vendors is accomplished by using the open source software package jclouds.

IBM Research 2008-2011

RESERVOIR – researcher, programmer, activity lead

RESERVOIR <http://www.reservoir-fp7.eu> is a cloud computing research project partially supported by the European Community's Seventh Framework Programmer. RESERVOIR's goal was to design and implement a reference architecture that allows Cloud Computing Providers to dynamically partner with each other to create a seemingly infinite pool of IT resources to Cloud Computing Consumers while fully preserving the autonomy of technological and business management decisions. To this end, RESERVOIR leveraged and extended the advantages of virtualization, grid computing and embeds autonomous management into the infrastructure.

I was the activity lead for the lowest level of the RESERVOIR stack, the Virtual Execution Environment Host (VEEH). VEEH provides an abstraction to the virtualization technology to allow Management of Virtual Resources in a generic manner. This means it interacts with the different physical virtualization platforms in the RESERVOIR site to perform the elementary control and monitoring of virtual machines (VM) and their resources (e.g. creating a VM, allocating additional resources to a VM, monitoring a VM, migrating a VM, creating a virtual network and storage pool, etc.). Our most important achievements were rapid virtual machine provisioning that exploits master image caching and copy-on-write cloning, transparent migration with or without shared storage, private virtual networks (VANS) that can cross subnets and cloud federation allowing VM placement and migration across administrative boundaries.

IBM SSG Research Development 2007

BladeCenter Multi-Chassis Interface – researcher, programmer

Responsible for designing and developing the low level interface to support managing many BladeCenters concurrently from a single source. The code will run stand-alone or integrated into BladeCenter management module (see Programmer's Guide- http://lnx-nagin/home/nagin/project/MasterMM/doc/mm_cmd_prog_guideV1_1.pdf). The commercially available BladeCenter management module only supports management of a single BladeCenter. Related technical skills: c and some PHP and Perl programming.

IBM IGS Research Development 2006/09-2006/12

GDRD-G4 – researcher, programmer

Responsible for designing and developing a set of tools to assist system administrators to write general purpose and platform independent scripts more efficiently. The project's funding was cancelled, but I create a internal website to demonstrate the toolset (see <http://lnx-nagin/home/nagin/project/assist/src/>) Related technical skills: Perl, JavaScript and PHP programming.

IBM E&TS Development 2006-2006/09

Lucent – IBM ASBU Port - Programmer

Responsible for porting Lucent telephone application server installation shell scripts that currently run on Sun/Solaris to run on IBM BladeCenter/Linux. Related technical skills: ksh programming; some Linux system administration, IBM Director, SNMP, and CIM.

IBM TotalStorage DS6000 Development 2004-2006

Storage Management - Team lead

Responsible for development and quality assurance of three DS6000 Storage Management components: remote support, firmware installation, and service interface. Related technical skills: Java and ksh programming and some Linux system administration.

Software Verification Tool Development 1999-2004

AGEDIS – Test Execution Engine Project Leader

TCBeans - Test Execution Engine Project Leader and lead programmer

GOTCHA-TCBeans deployment, marketing and support

Responsible for customer communication and support. projects under test:

- 3 tier DB application, Spain
- Pervasive Computing, Austin
- Microcode Service Processor, Austin
- Universal Contact Manager development and test (Call Center), Haifa/Raleigh
- Pcomm/Host On Demand development and test, Raleigh
- OS/390 UNIX System Services Function Test (Sysplex), Poughkeepsie
- Communications Server System 390 Function Test, Raleigh

Related technical skills: Java programming and xml schema development.

Software Test Design and Coordination 1996-1999

projects under test:

- IP Phone
- Hermitage
- PSTN Gateway
- IP over CATV
- NetDA

Related technical skills: Java and Python programming.

Microcode Design & Test 1994-1996

- Test Team Lead
- Wrote hardware specification for CATV network adapter card

Microcode Design & Development 1985-1994

- Project leader and microcoder on IBM's disaster recovery solution for enterprise level storage sub-systems
- Designer and microcoder on IBM's Concurrent Copy, which allows read/write access to data during a media backup
- Microcoder on DAIOS, which simulated disk activity by exploiting 3990 control unit cache

Related technical skills: Assembler and Rexx programming.

IBM USA
Poughkeepsie, N.Y.

System Programmer 1982-1985

- System test project leader to verify mainframe I/O recovery architecture

Related technical skills: Rexx programming.

Papers and presentations

- **Storlet Engine for Executing Biomedical Processes within the Storage System**, Simona Rabinovici-Cohen, Ealan Henis, John Marberg and Kenneth Nagin, Proceedings of the 7th International Workshop on Process-oriented Information Systems in Healthcare (ProHealth), September 2014, Eindhoven, the Netherlands.
- **Storlet Engine: Performing Computations in Cloud Storage**, Simona Rabinovici-Cohen, Ealan Henis, John Marberg and Kenneth Nagin, "[Technical Report H-0320](#)", IBM Research – Haifa, August 2014.
- **PDS Cloud: Long Term Digital Preservation in the Cloud**, Simona Rabinovici-Cohen (IBM), John Marberg (IBM), Kenneth Nagin (IBM), David Pease (IBM), IEEE International Conference on Cloud Engineering (IC2E), March 25-27, 2013, San Francisco, USA
- **Preservation DataStores in the Cloud (PDS Cloud): Long term digital preservation in the cloud**, Simona Rabinovici-Cohen (IBM), John Marberg (IBM), Kenneth Nagin (IBM), Technical Report H-0318, IBM Research – Haifa, January 2013
- **ENSURE: Long term digital preservation of Health Care, Clinical Trial and Financial data**, M. Braud, O. Edelstein, J. Rauch, S. Rabinovici-Cohen, K. Nagin, J. Marberg, D.

Voets, I. Sanya, I. Sanya, M. Badaway, E. Shehab, F. Randers, A. Driopert, M. Klecha, iPress 2013

- **Inter-Cloud Mobility of Virtual Machines**, K. Nagin, D. Hadas, Z. Dubitzky, A. Glikson, I. Loy, B. Rochwerger, L. Schour, Systor 2011
- **Reservoir - When One Cloud Is Not Enough**, B. Rochwerger, D. Breitgand, A. Epstein, D. Hadas, I. Loy, K. Nagin, J. Tordsson, C. Ragusa, M. Villari, S. Clayman, E. Levy, A. Maraschini, P. Massonet, H. Muñoz, G. Tofetti IEEE Computer March 2011 (vol. 44 no. 3) pp. 44-51.
<http://www.computer.org/portal/web/csdl/doi/10.1109/MC.2011.64>
- **An Architecture for Federated Cloud Computing**, B. Rochwerger, C. Vázquez, D. Breitgand, D. Hadas, M. Villari, P. Massonet, E. Levy, A. Galis, I. Llorente, R. Montero, Y. Wolfsthal, K. Nagin, L. Larsson, F. Galán, Chapter 15 of "Cloud Computing: Principles and Paradigms" book - Rajkumar Buyya (Ed.), James Broberg (Ed.) and Andrzej Goscinski (Ed.), Wiley 2010
- **Monitoring Service Clouds In the Future Internet**
B. Rochwerger, J. Caceres, R.S. Montero, D. Breitgand, E. Elmroth, A. Galis, E. Levy, I.M. Llorente, K. Nagin, Y. Wolfsthal, {F}uture {I}nternet {A}ssembly {FIA}, 2010, <http://www.future-internet.eu/>. Chapter in book "Towards the Future Internet - Emerging Trends from European Research" book published IOSPress 12th April 2010; ISBN 978-1-60750-538-9, ISBN 978-1-60750-539-6 (online) <http://www.booksonline.iospress.nl/Content/View.aspx?piid=16465>
- **The RESERVOIR Model And Architecture for Open Federated Cloud Computing**
B. Rochwerger, J. Caceres, R.S. Montero, D. Breitgand, E. Elmroth, A. Galis, E. Levy, I.M. Llorente, K. Nagin, Y. Wolfsthal, IBM System Journal Special Edition on Internet Scale Data Centers, 2009, <http://www.reservoir-fp7.eu/>
- **The AGEDIS Tools for Model Based Testing**, A. Hartman, K. Nagin, ISSTA 2004, Boston.
- **Model Driven Testing, AGEDIS Architecture Interfaces and Tools**, A. Hartman, K. Nagin, 1st European Conference on Model Driven Software Engineering 2003, Nuremberg.
- **A Test Execution Environment Running Abstract Tests for Distributed Software**, A. Hartman, A. Kirshin, K. Nagin,

SEA 2002.

- **Projected State Machine Coverage for Software Testing**, A. Hartman, K. Nagin, T. Shiran, G. Freidman, ISSTA 2002
- **TCBeans Automated Software Test Tool Kit**, Kenneth Nagin and Alan Hartman, Quality Week 1999, San Jose, CA
- **Project Management with Lotus Notes**, Kenneth Nagin and Benny Rochwerger, 2nd Lotus Notes Best Practices 1999, Boston, MA

Open Source Contributions

- **jclouds** <http://www.jclouds.org/>, extending jclouds to support CDMI <http://cdmi.sniacloud.com/>, currently developing
- **libvirt** <http://libvirt.org/>, extending libvirt to support VM live migration between host that do not share storage, 2010

IBM Awards

- 2012 8th Plateau Patent Invention Achievement Award
- 2007 7th Plateau Patent Invention Achievement Award
- 2006 6th Plateau Patent Invention Achievement Award
- 2006 Research Division Award – DS6000 System Management
- 2004 5th Plateau Patent Invention Achievement Award
- 2002 Outstanding Technical Achievement – GOTCHA-TCBeans
- 2002 4th Plateau Patent Invention Achievement Award
- 1998 3rd Plateau Patent Invention Achievement Awards
- 1993 Outstanding Technical Achievement – Concurrent Copy
- 1993 Market Driven Quality Award
- 1993 2nd Plateau Patent Invention Achievement Awards
- 1992 1st Plateau Patent Invention Achievement Awards
- 1989 Work Excellent
- 1982 Informal Award

Patents

- **IL920120034US** Remote Provisioning of Virtual Appliance for accessing Virtualized Storage, 2012
- **IL920110009US1** MIGRATION OF VIRTUAL RESOURCES OVER REMOTELY CONNECTED NETWORKS, 2011
- **IL9-2010-0089** Optimized Deployment of Replication of Virtual Machines, 2010
- **RSW920100021US1** Method to Consolidate Disparate Unique International SMS Messages and Subsequently Deliver respective message to multiple End users, 2010
- **TUC820060259** TRANSPARENT RECOVERY OF A DEFECTIVE SELF-SUSTAINED CODE-UPGRADE BY, "SURGICALLY" ON-THE-FLY FIXING OF THAT IN-USE CODE, INSTEAD OF REPLACING IT. 2006
- **IL920060049US1** Preventing Phishing by a Two-Way

Authentication and, by providing an acknowledgement through alternate means of communication 2006

- **IL920060083US1** AUTOMATIC RECOVERY OF CONCURRENT CODELOAD FAILURES FOR HIGHLY AVAILABLE SYSTEMS 2006
- **IL920060058US1** PROVIDING INFORMATION REGARDING MAILING LIST ALIASES 2006
- **IL920040034US1** Primary and Recovery File System Management 2004
- **IL920040035US1** Checking Storage Reconfiguration 2004
- **US07024589** Reducing the Complexity of Finite State Machine Test Generation Using Combinatorial Designs 2002
- **US07089534** MODEL BASED TEST GENERATION FOR VALIDATION OF PARALLEL AND CONCURRENT SOFTWARE 2002
- **US07117484** Recursive use of model based test generation for middleware validation 2001
- **US06944848** Technique using persistent foci for finite state machine based software test generation 2000
- **RSW920000118US1** A method and system for integrating test coverage measurements with model based test generation 2000
- **US07055065** method, system, and computer program product for automated test generation for non-deterministic software using state transition rules 2000
- **US06430183** data transmission system based upon orthogonal data/stream mapping 1997
- **US06275964** software enhanced error correction mechanism in a data communication system 1997
- **US05606679** Method for optimal retrieval of non-volume-specific data 1994
- **US05594900** System and method for providing a backup copy of a database 1992
- **US05493724** utility volume for non-specific reads 1992
- **US05375232** Method and system for asynchronous pre-staging of backup copies in a data processing storage subsystem 1992
- **US05448718** Method and system for time zero backup session security 1992
- **US05379398** Method and system for concurrent access during backup copying of data 1992
- **US05241669** Method and system for sidefile status polling in a time zero backup copy process 1992

Education

- 1979–1980 University of Pittsburgh, B.S., Computer Science.
- 1973–1976 University of Wisconsin, B.A. Communications

Interests

Hiking, biking, raising four very special children