IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
AUSTIN DIVISION

CROSSROADS SYSTEMS, INC.	§	
	§	
v.	§	C.A. NO. 1:13-cv-00800-SS
	§	
DOT HILL SYSTEMS CORP.	§	
CROSSROADS SYSTEMS, INC.	§	
	§	
v.	§	C.A. NO. 1:13-cv-00895-SS
	§	
ORACLE CORPORATION	§	
CROSSROADS SYSTEMS, INC.	§	
	§	
v.	§	C.A. NO. 1:13-cv-01025-SS
	§	
HUAWEI TECHS. CO., LTD., ET AL.	§	
CROSSROADS SYSTEMS, INC.	§	
	§	
v.	§	C.A. NO. 1:14-cv-00148-SS
	§	
CISCO SYSTEMS, INC.	§	
CROSSROADS SYSTEMS, INC.	§	
	§	
v.	§	C.A. NO. 1:14-cv-00149-SS
	§	
NETAPP, INC.	§	
CROSSROADS SYSTEMS, INC.	§	
	§	
v.	§	C.A. NO. 1:14-cv-00150-SS
	§	
QUANTUM CORPORATION	§	

DECLARATION OF RANDY KATZ REGARDING CLAIM CONSTRUCTION OF U.S. PATENT NOS. 6,425,035, 7,051,147, 7,934,041, AND 7,987,311

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I, Randy H. Katz, declare as follows:

1. I have been retained by Defendants Dot Hill Systems Corp., Oracle Corporation, Huawei Technologies Co., Ltd., Huawei Enterprise USA, Inc., Huawei Technologies USA, Inc., Cisco Systems, Inc., NetApp, Inc., and Quantum Corporation (collectively "Defendants") to offer opinions regarding the meanings that certain claim terms in U.S. Patent Nos. 6,425,035 (the "'035 patent"), 7,051,147 (the "'147 patent"), 7,934,041 (the "'041 patent"), and 7,987,311 (the "'311 patent") (collectively, the "Patents-in-Suit") would have had to a person of ordinary skill in the art at the time of the alleged invention in those patents. This declaration summarizes my opinions relating to the issues addressed below.

I. Qualifications

2. I have studied, taught, and practiced computer science and engineering for over forty years. I earned an A.B. in Computer Science from Cornell University in 1976, and a M.S. and Ph.D. in Computer Science from University of California at Berkeley in 1978 and 1980, respectively. I worked in private industry as a computer scientist from 1980-81, and served as an assistant professor of computer science at the University of Wisconsin-Madison from 1981-83. I served as the Program Manager and Deputy Director of the Computer Systems Technology Office for the Advanced Research Projects Agency of the U.S. Department of Defense from 1993-94.

3. I joined the faculty of the Computer Science Division of the Electrical Engineering and Computer Sciences Department (EECS) of the University of California at Berkeley in 1983, where I have been to this day. I became a full professor in 1989, and served as the Chairman of the EECS Department from 1996-99. Since 1996, I have been the United Microelectronics Corporation Distinguished Professor in Electrical Engineering and Computer

Science. My research interests have included high performance multiprocessor architectures and protocols, storage architectures, transport protocols spanning heterogeneous networks, and network and service architectures. I have taught and continue to teach courses that cover topics relevant to storage systems and protocols, including advanced graduate seminars as well as courses in undergraduate and graduate computer architecture and computer communications networks.

4. Beginning in the late 1980s, with colleagues at Berkeley, I developed the essential framework for describing the tradeoff between reliability and performance in storage systems. That work led to the creation and wide-spread adoption of Redundant Arrays of Inexpensive Disks (RAID), which is still widely used today. In 1999, I along with two of my colleagues at Berkeley won the IEEE Reynolds Johnson Storage System Award, the highest professional recognition in the storage systems field, for our foundational work in and development of RAID. I have also earned other honors and awards and have been recognized for my work in the field of computer science and engineering. I am a Fellow of the Association for Computing Machinery (ACM), the Institute of Electrical and Electronics Engineers (IEEE), American Association for the Advancement of Science (AAAS), and American Society for Engineering Education (ASEE). I am a member of the National Academy of Engineering (NAE), the highest recognition that can be bestowed on an engineer in the United States, and the American Academy of Arts and Sciences.

5. I have published over 250 technical papers, book chapters, and books in the field of computer science and engineering, including in the field of storage systems, in particular. I authored the textbook entitled Contemporary Logic Design used at over 200 colleges and universities. I have presented at numerous conferences on computer systems and networking,

including the keynote addresses of the IEEE International Conference on Distributed Computing Systems and the International Conference on Networking Protocols. I serve and have served on several government and university advisory boards and the technical advisory board of several companies in the computer and storage field. I serve and have served as editor or referee for several academic journals, such as ACM Transactions on Computer Systems and the NSF Computer Engineering Section. I am also a named inventor on three U.S. storage-related patents, Nos.: 5,195,100, 5,475,697, and 5,758,054 ("Non-volatile memory storage of write operation identifier in data storage device").

6. Attached hereto as Exhibit 1 is a true copy of my curriculum vitae, which provides a more complete description of my educational background, experience, publications and other qualifications in the area of computer science, engineering, and storage systems.

II. Technology Background

A. Storage Systems

7. Generally speaking, storage allows information to persist on computer systems. A storage system is based on technologies—such as magnetic or optical recording manifested in terms of disks and tapes—that allow information to be retained for the long term.

8. A disk drive does not usually interface with a host computer directly. At the very least, an intermediary hardware component, called a disk controller, sits between a host computer and the storage device, offloading from the former the details of managing the sequencing of input/output operations. The host specifies an operation to "read" or "write" a sequence of characters at a specified offset into a "logical" (virtual) device, *i.e.*, the logical input/output request. The disk controller is responsible for converting the logical request into detailed "seek" and "transfer" operations at a "physical" level. Generally, given the mechanical overheads

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