To produce a short (2-4 page) biography of a key software engineer, discussing the work and impact of the individual.

Vinton Grey Cerf

- The 'Father of the Internet' as he is known across the globe was born in New Haven, Connecticut on the American east coast above New York on the 23rd June 1943.
- That same year Alan Turing was tasked with disclosing information on decoding the enigma machine to American cryptanalysts at Bell Laboratories which had only recently moved from New York to Murray Hill, New Jersey.
- The world of Computer Science as we know it today was still in its infancy. The world would have to wait another year for D-Day - the Allies landed on the beaches of Normandy is often referred to as the turning point of the Second World War.
- Cerf's father was an aerospace executive.

- Fast forward to High School where Cerf attended Van Nuys High School which is a public high school in Van Nuy, California on the west coast of America
- Notably, Jon Postel and Steve Crocker were in Van Nuy high school at the same time as Cerf.
- Postel is known as 'The God of the Internet' for his work on Request for Comment document series and Simple Mail Transfer Protocol. His obituary was written by Cerf and published as RFC 2468 as a mark of respect of Postel's work on the Internet.
- Crocker is the inventor of Request for Comment series and worked on the protocols for the ARPANET which were the foundation for today's Internet.
- All 3 studied and worked at UCLA in 1970s, however Cerf studied Mathematics at Stanford before getting his M.S. Degreed and then PhD from UCLA.
- 3 Giants of the Internet all growing up together. It is hard to imagine a world without the internet and maybe if these 3 giants of the Internet hadn't met in high school we would not be where we are today.

- In 1959 computerizing the 'World Brain'

- Cerf went on to study mathematics at Stanford and then completed his PhD in Computer Science at UCLA in 1972.
- In 1960's both Crocker and Postel are Postgraduate engineers at UCLA working on the early projects of ARPANET.

- ARPANET was an early packet-switching network which was founded by the Advanced Research Projects Agency (ARPA) of the United States Department of Defense.
- The packet-switching methodology in ARPANET was based on concepts and designs by Paul Baran, Donald Davies, Leonard Kleinrock and Lawrence Roberts.
- At UCLA Cerf started working under Leonard Kleinrock's data packet netwroking group that connected the first two nodes of the ARPANet.
- During his work he met Bob Kahn

- 1969 two programmers at Bell Labs create Unix operating system
- 1976 Steve Wozniak completes the Apple1and released the Apple 2 a year later.. Apples 2's were sold from 1977 to 1993
- 1978 First computers installed in the white house
- 1980 Tim Berners Lee creates Enquire - a networked hypertext system used for project management. It seeks to categorize hyperlinks in a way that can be read by computers as well as people.
- 1981 IBM releases its first Personal Computer that included Micrsoft Disk Operating System (MS-DOS) which became Windows Operating System
- 1983 Apples releases the Lisa Computer with the first Graphical User Interface and the same year Microsoft introduces Word
- 1984 Apples launches Macintosh with 1984 commercial.. That same year OSI is published so the protocol war begins
- 1987 Apple introduce Hypercard - a hypertext program that linked stacks of cards but you can only click through to other cards on the same computer. Hypercard influenced the creation on the Internet protocol HTTP and JavaScript.
- Steve Jobs, forced out of Apple in 1985, founds a new company – NeXT.
- 1989 At its official 1983 launch, the Internet had been a modest experimental network of networks owned by the U.S. government. As late as 1989, even insiders are betting against it – OSI is the official favorite for the future of internetworking, or connecting networks together. But in the meantime the Internet has quietly grown to 100,000 host machines, each with multiple users. By 1992 the Internet will have emerged as the new global standard, linking a million computers. In hindsight, the Internet has several key advantages, from a growing community of enthusiasts churning out working software and hardware, to free distribution with the UNIX operating system, to being built in to common hardware like Cisco routers. But the decisive factor? Probably money—especially U.S. government support from the National Science Foundation's NSFNET and other sources. At the instigation of computer pioneers, Senator Al Gore begins working in 1987 on what will become his High Performance Computing and Communication Act. When it is funded in 1991, the Act creates the National Information Infrastructure, which promotes and funds over $600 million worth of various networking initiatives. Gore famously calls it the "information superhighway."

- 1990 At the world's biggest physics laboratory, CERN in Switzerland, English programmer and physicist Tim Berners-Lee submits two proposals for what will become the Web, starting in March of 1989. Neither is approved. He proceeds anyway, with only unofficial support from his boss and his coworker Robert Cailliau. By Christmas of 1990 he has prototyped "WorldWideWeb" (as he writes it) in just three months on an advanced NeXT computer. It features a server, HTML, URLs, and the first browser. That browser also functions as an editor—like a word processor connected to the Internet – which reflects his original vision that the Web also incorporate authoring and personal organization tools. The idea is that a Web of useful links will grow and deepen as people create them in the course of their daily lives. The Web had been partly inspired by his earlier Enquire program, which had combined networked hypertext with ideas that would later evolve into the Semantic Web.

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- 1969- 1971 worked for DARPA on ARPANET which was an experiment in packet-switching to see if computers could communicate using packet-switching as an alternative to circuit switching which was the way the telephone system worked. Started in 1969 where by the end of 1969 they had four nodes up and running. By the end of 1970 it had expanded where there were 50 sites including site in Europe.
- October 1972, Cerf moved from UCLA to Stanford.. Bob Kahn moved from working in Bolt Beranek and Newman Inc in Cambridge, Massachusetts which made the packet switches for ARPANET to the Information Processing Techniques Office (IPTO) within DARPA
- 1973 came to him explaining that they wanted to use computers for command and control. So to do that you would need put computers at sea, on planes and on mobile vehicles. The ARPANET was built on dedicated telephone circuits. If you tried to connect the ships with wires etc wouldn't work. So they had to develop mobile packet radio and packet satellite for long distance communication from ship to ship and ship to shore. Kahn had already started work on a mobile radio satellite system. His problem was how do we connect all these packet networks together. How are we going to make this look like one network even though it is several different ones.. At the same time Xerox are inventing the Ethernet and another ARPA project in Hawaii has another network at the time as well. So there were four different networks and after 6 months they had designed the basic protocols of TCP/IP that we use today. So they had to come up with how big the network might be. They guessed there would be 2 networks in every country and multiplied it by how many countries they thought there might be in the world so they guessed 128. So that was 256 networks which is 8 bits. They guessed there would be 16 million computer connected to each network. 16 million is 24 bit so they ended up with a 32 bit address space. 4.3 billion possible terminations

- on the network in 1978. This was IP4 which lasted until 1992 they extended the address space which is 128 bit space known as IP6.
- Here Bob Kahn started working on a mobile network that didn't require cable network. He came to Cerf's labs in Stanford to try solve the problem….
- So in the Spring of 1973 the started working on what would become the TCP/IP protocol suite.
- He left Stanford in 1976 to work for DARPA to develop TCP/IP, packet radio, packet satellite and packet security technology.
- Then in 1982 became Vice President of MCI Digital Information Services where he led the first commercial email service to be connected to the internet.

- First introduced to computers in 1958 at System Development Corporation in Santa Monica. His dad had a friend there. This corporation were using SAGE that took radar to detect Russian bombers flying over the pole. This was the year that the first integrated circuit was introduced.
- Then 2 years later his best friend Steve Crocker got permission to use the computers in UCLA while they were still in high school.   Used a MENDEX machine. You would punch holes in the tape and put into the computer and it would compile and punch out tape as an answer.
- Mutual reinforcement the 3, Steve Crocker, Postel and Cerf of them were so invested in this concept. Principal investigators didn't get involved in the protocol work so they were graduate students primarily working on them.
- April 4th 1969, Steve started a series of notes called RCF and Postel became the editor.
- Van Nuy - Marilyn Monroe went to the same school
- In 1976 until 1983 went to ARPA to get this stuff actually built.

- 1986 joined Bob Kahn at Corporation for national Research Initiatives as Vice President, working on digital libraries, knowledge robots and gigabit speed networks.
- In 1992, that he and Kahn, amon others, founded the Internet Society (ISOC) to provide leadership in education, policy and standards related to the internet. Cerf served as the first President ISOC.
- Rejoined MCI in 1994 and served as Senior Vice President for Technology Strategy, helping guide corporate strategy development from a technical perspective.
- Chief Internet Evangelist at Google - "Selling your ideas is the only way to make significant progress."
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- It took until 1993 for US to say that TCP/IP was main protocol over OSI.
- Cerf and Kahn were the winners of the Turing Award for 2004,[11] for their "pioneering work on internetworking, including .. the Internet's basic communications protocols .. and for inspired leadership in networking."[62]
- In November 2005, Vinton Cerf and Kahn were awarded the Presidential Medal of Freedom by President George W. Bush for their contributions to the creation of the Internet

- Cerf has worked for Google as a Vice President and Chief Internet Evangelist since October 2005.[5] In this function he has become well known for his predictions on how technology will affect future society, encompassing such areas as artificial intelligence, environmentalism, the advent of IPv6 and the transformation of the television industry and its delivery model.[29]
- Since 2010, Cerf has served as a Commissioner for the Broadband Commission for Digital Development, a UN body which aims to make broadband internet technologies more widely available.
- Cerf helped fund and establish ICANN, the Internet Corporation for Assigned Names and Numbers. He joined the board in 1999, and served until November 2007.[30] He was chairman from November 2000 to his departure from the Board.
- Cerf was a member of Bulgarian President Georgi Parvanov's IT Advisory Council (from March 2002 – January 2012). He is also a member of the Advisory Board of Eurasia Group, the political risk consultancy.[31]
- Cerf is also working on the Interplanetary Internet, together with NASA's Jet Propulsion Laboratory and other NASA laboratories. It will be a new standard to communicate from planet to planet, using radio/laser communications that are tolerant of signal degradations including variable delay and disruption caused, for example, by celestial motion.[32]
- On February 7, 2006, Cerf testified before the U.S. Senate Committee on Commerce, Science, and Transportation's hearing on network neutrality. Speaking as Google's Chief Internet Evangelist, Cerf noted that nearly half of all consumers lacked meaningful choice in broadband providers and expressed concerns that without network neutrality government regulation, broadband providers would be able to use their dominance to limit options for consumers and charge companies like Google for their use of bandwidth.[33]
- Cerf currently serves on the board of advisors of Scientists and Engineers for America, an organization focused on promoting sound science in American government.[34] He also serves on the advisory council of CRDF Global (Civilian Research and Development Foundation) and was on the International Multilateral Partnership Against Cyber Threats (IMPACT) International Advisory Board.[35]
- Cerf was elected as the president of the Association for Computing Machinery in May 2012[36] and joined the Council on CyberSecurity's Board of Advisors in August 2013.[37]
- From 2011 to 2016, Cerf was chairman of the board of trustees of ARIN, the Regional Internet Registry (RIR) of IP addresses for United States, Canada, and part of the Caribbean.[38] Until Fall 2015, Cerf chaired the board of directors of StopBadware, a non-profit anti-malware organization that started as a project at Harvard University's Berkman Center for Internet & Society.[39][40] Cerf is on the board of advisors to The Liquid Information Company Ltd of the UK, which works to make the web more usefully interactive and which has produced the Mac OS X utility called 'Liquid'.[41] Vint Cerf is a member of the CuriosityStream Advisory Board.[42]

- During 2008, Cerf chaired the Internationalized domain name (IDNAbis) working group of the IETF.[43] In 2008 Cerf was a major contender to be designated the US's first Chief Technology Officer by President Barack Obama.[44] Cerf is the co-chair of Campus Party Silicon Valley, the US edition of one of the largest technology festivals in the world, along with Al Gore and Tim Berners-Lee.[45] From 2009 to 2011, Cerf was an elected member of the Governing Board of the Smart Grid Interoperability Panel (SGIP). SGIP is a public-private consortium established by NIST in 2009 and provides a forum for businesses and other stakeholder groups to participate in coordinating and accelerating development of standards for the evolving Smart Grid.[46] Cerf was elected to a two-year term as President of the Association for Computing Machinery (ACM) beginning July 1, 2012.[47] In 2015 Cerf co-founded (with Mei Lin Fung), and is currently chairman of, People-Centered Internet (PCI).[48] On January 16, 2013, US President Barack Obama announced his intent to appoint Cerf to the National Science Board.[49] Cerf served until May 2018 when his six-year term expired.
- Cerf is also among the 15 members of governing council of International Institute of Information Technology, Hyderabad.[50]
- In June 2016, his work with NASA led to Delay-tolerant networking being installed on the International Space Station with an aim towards an Interplanetary Internet.[51]
- Since at least 2015, Cerf has been raising concerns about the wide-ranging risks of digital obsolescence, the potential of losing much historic information about our time – a digital "dark age" or "black hole" – given the ubiquitous digital storage of text, data, images, music and more. Among the concerns are the long-term storage of, and continued reliable access to, our vast stores of present-day digital data and the associated programs, operating systems, computers and peripherals required to access such
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Work of the individual

Impact of the individual's work

Background - life, education

https://www.computerhistory.org/timeline/1973/
Early networks successfully connected computers. But different kinds of networks couldn't link to each other, limiting the size of online communities. So, the next challenge has been creating "networks of networks," a process called internetworking or internetting.
France's CYCLADES and Britain's NPL network are experimenting with internetworking by 1973 with the European Informatics Network (EIN). Xerox PARC begins linking Ethernets with other networks using its PUP (PARC Universal Packet)

protocol the same year. Both these efforts will influence the development of ARPA's TCP/IP internetworking protocol, first sketched out in 1973 by Vint Cerf and Bob Kahn. ARPA has a practical need to link its original ARPAnet with its newer networks like the Packet Radio Network (PRNET) and Satellite Network (SATNET). In 1977 Cerf and Kahn will link the three networks and prove the efficacy of their TCP/IP protocol in a dramatic round-the-world transmission from a moving vehicle, the SRI Packet Radio Research van.

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