

CE 443 - Computer Networks

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Acknowledgments: Some of the slides are fully or partially obtained from other sources. Reference is noted on the bottom of each slide, when the content is fully obtained from another source. Otherwise a full list of references is provided on the last slide.



What happens when you click on a URL?

- When you click on a URL, 17 messages are exchanged on the internet
 - 6 message to translate the server name to IP address
 - 3 messages to setup a TCP connection
 - 4 messages for your browser to send the HTTP “get” request, and server response (assuming the page it self fits in one message)
 - 4 messages to tear down the connection

History



Early communication over Long Distance

- Between human beings
- Letter and messenger
 - Information carried by physical objects
 - Speed limited by transportation means: horse, bird, train, car
 - Bandwidth? Distance? Security?
- Fire
 - Early optical communication
 - Speed of light
 - Bandwidth? Distance? Security?



Communication Using Electrons

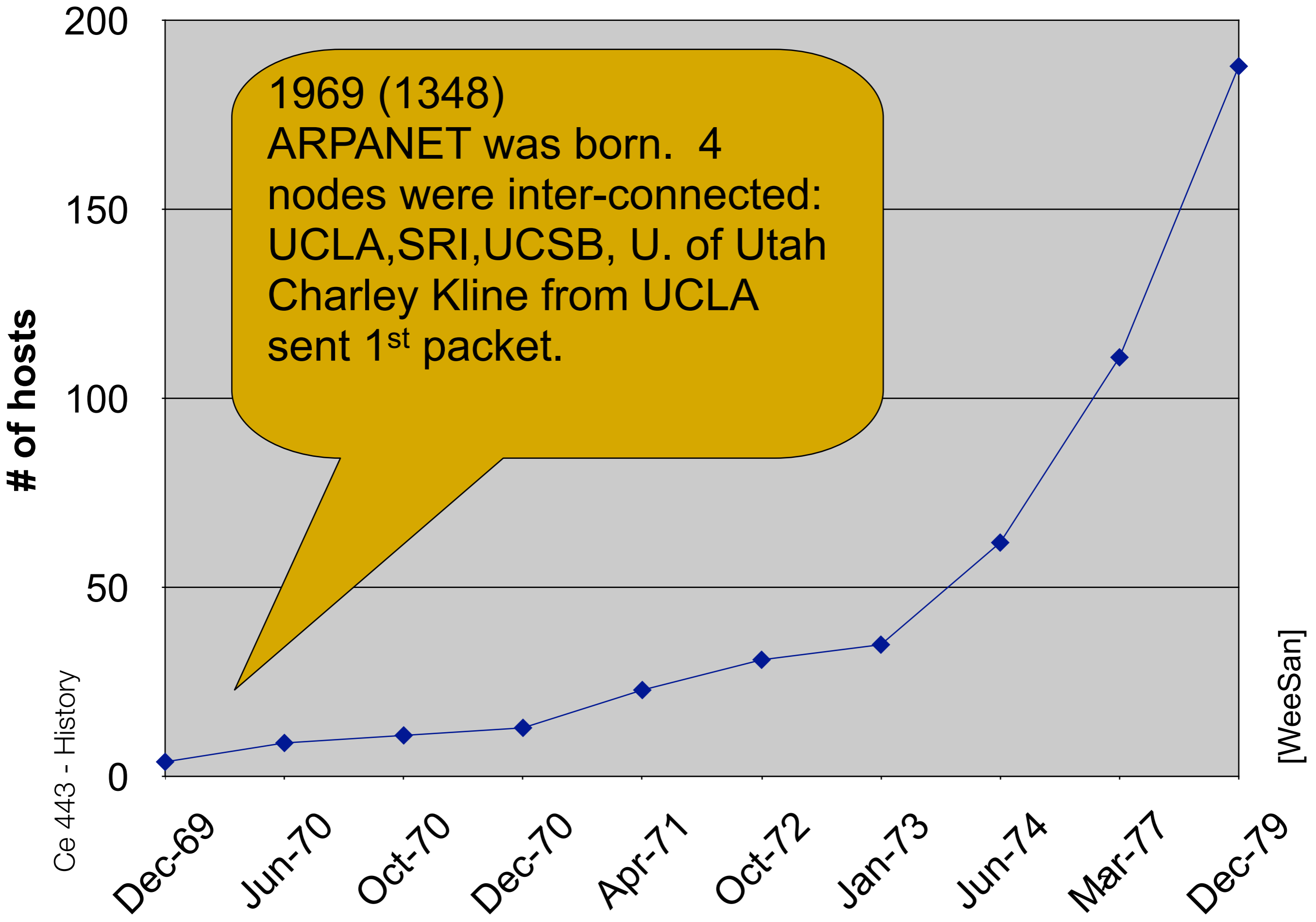
- 1827 (1206) Ohm's Law
- 1837 (1216) "Workable" telegraph invented by Samuel Morse
- 1838 (1217) demonstration over 16 kilometers at 10 w.p.m.
- 1851 (1230) Western Union founded
- 1868 (1247) Transatlantic cable laid
- **1876 (1255) Alexander Bell invented the telephone**
- 1885 (1264) AT&T formed
- 1892 (1271) First automated commercial telephone switch



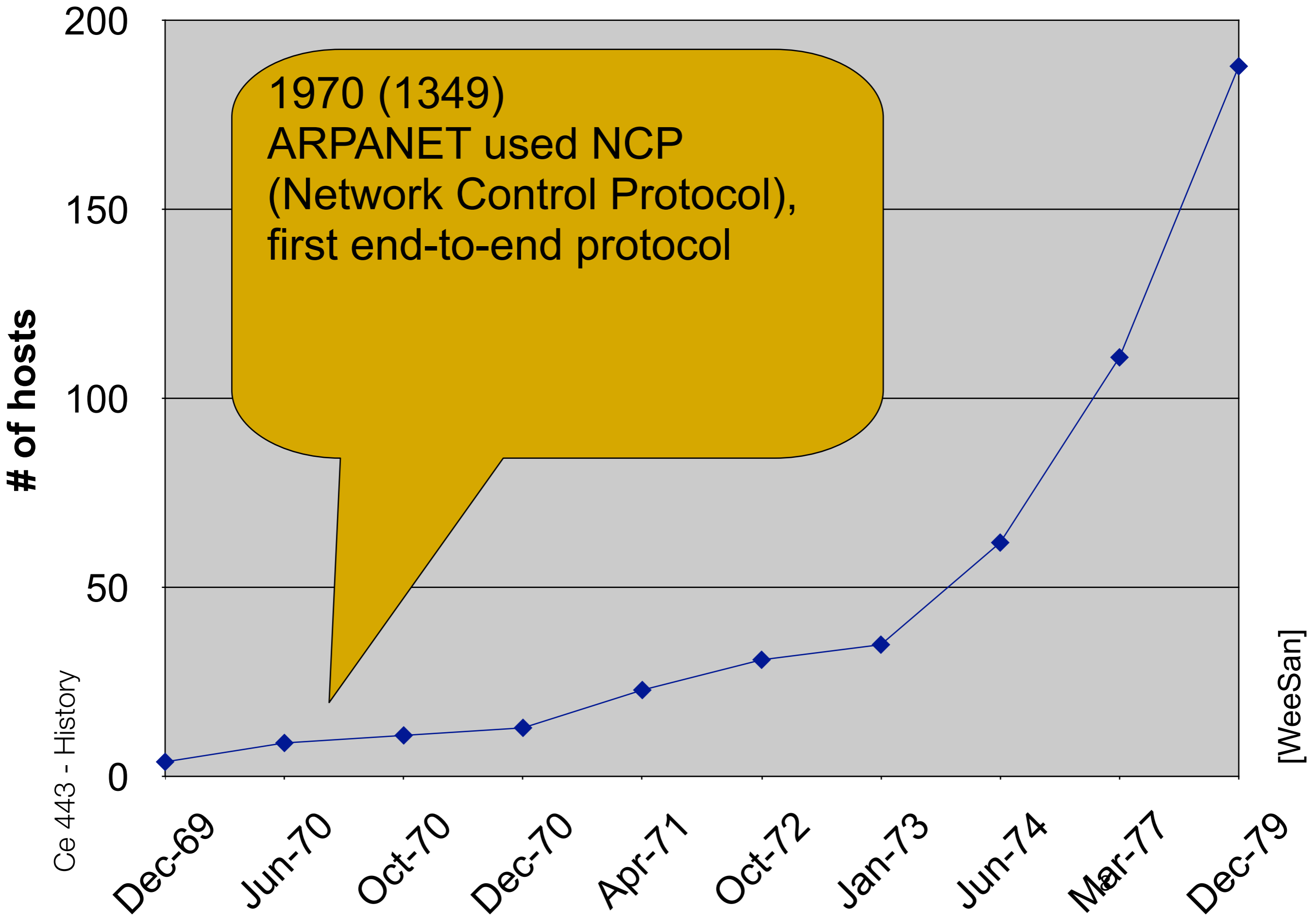
Age of Telephones

- 1903 (1282) 3 million phones in the U.S.
- 1915 (1294) First transcontinental telephone line
- 1948 (1327) Transistor invented by Bell scientists
- 1963 (1342) Digital transmission introduced
- 1965 (1344) 1ESS central office switch introduced
- **1969 (1348) Arpanet was born**
- 1985 (1364) Last telegraph circuit closed down
- 1999 (1378) Last 4ESS install in ATT network

Internet Hosts



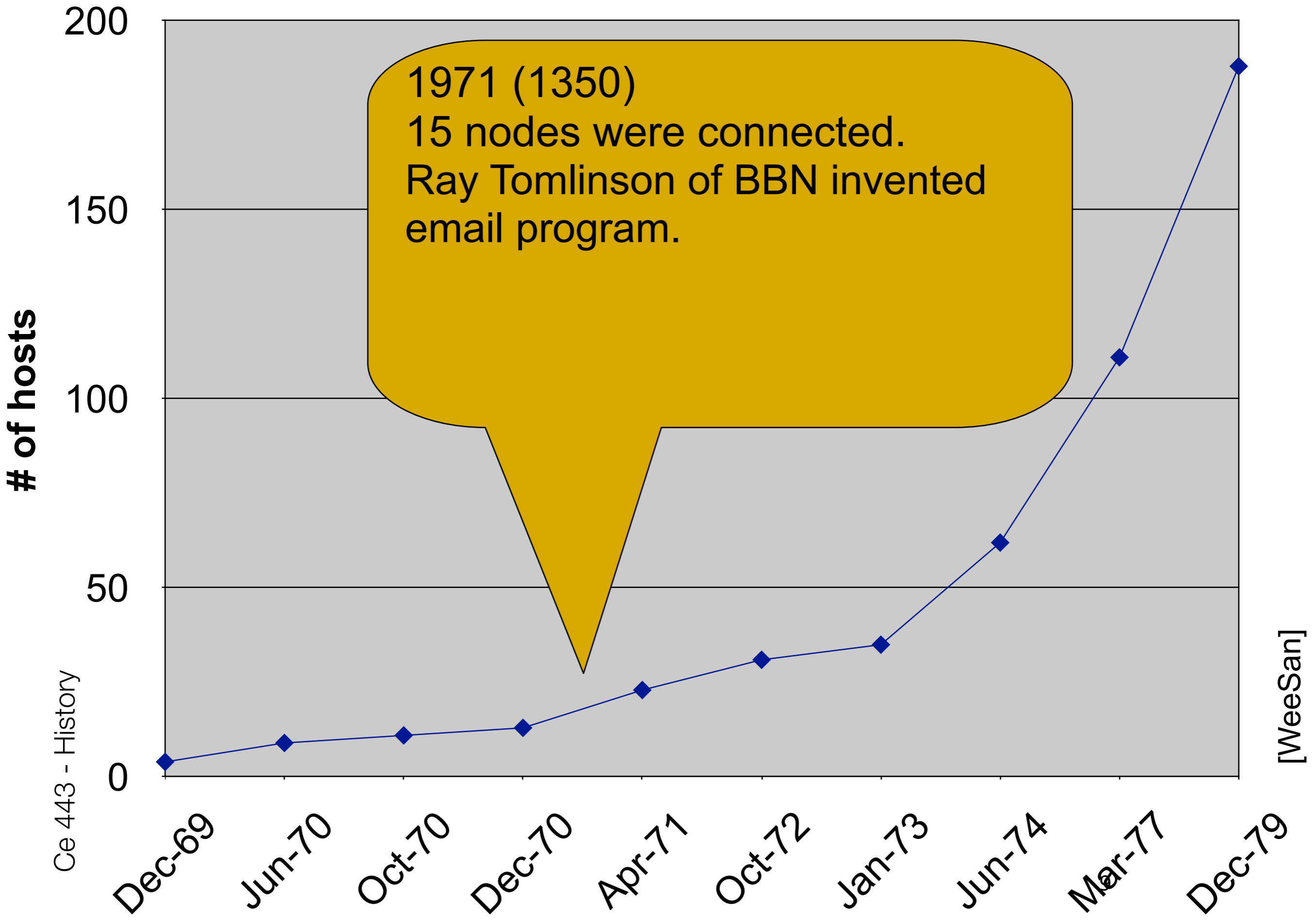
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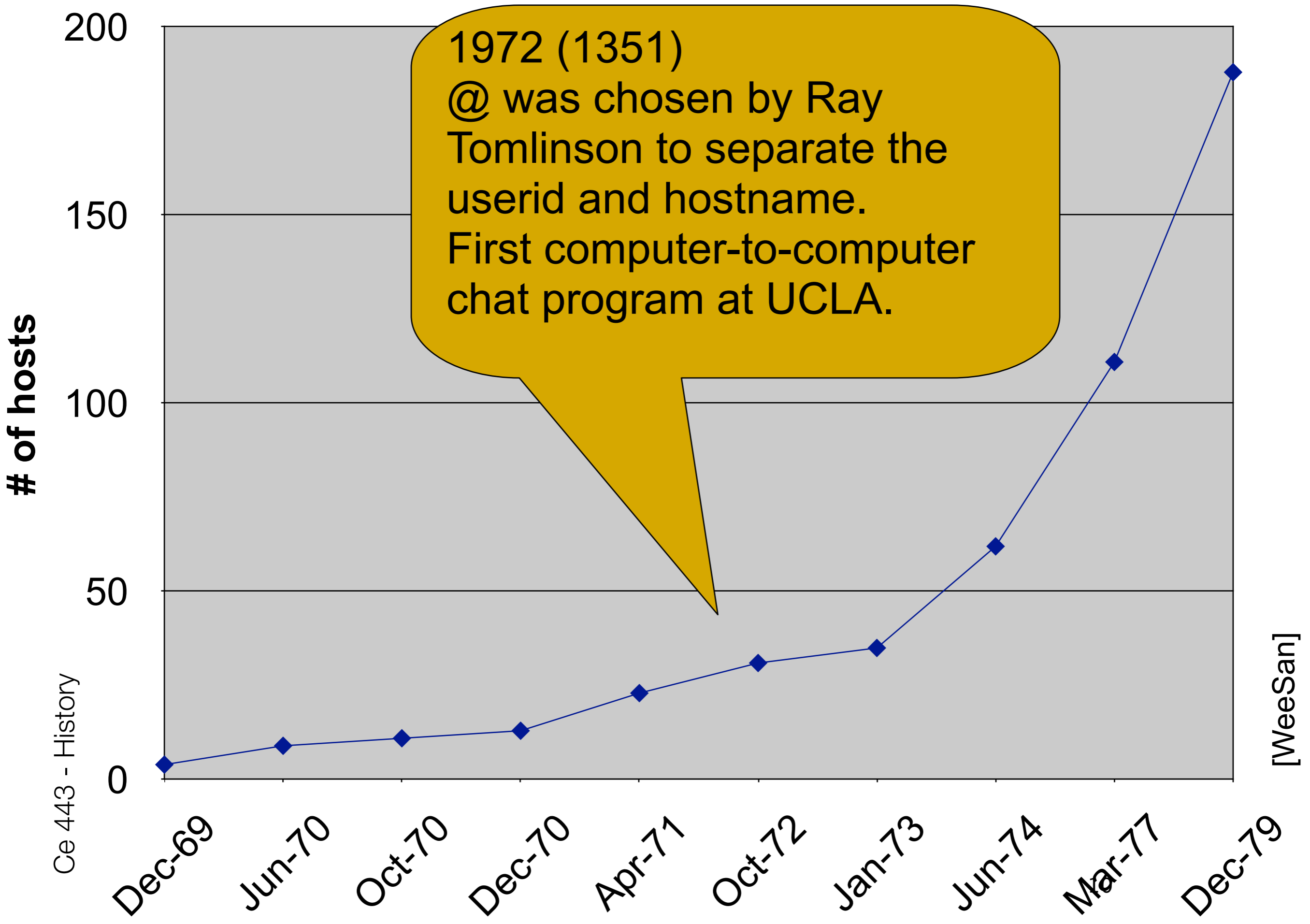


1971 (1350)
15 nodes were connected.
Ray Tomlinson of BBN invented
email program.

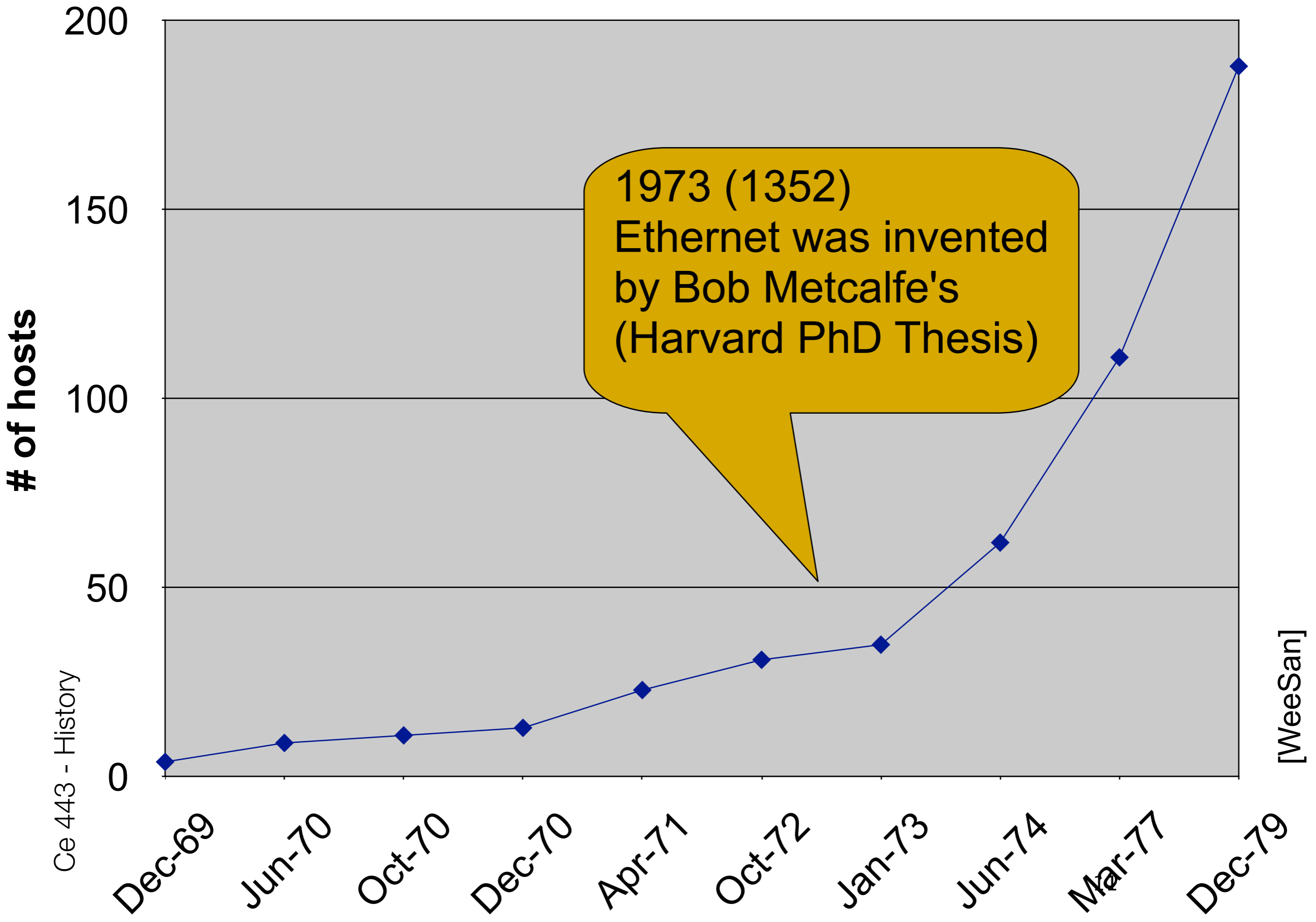
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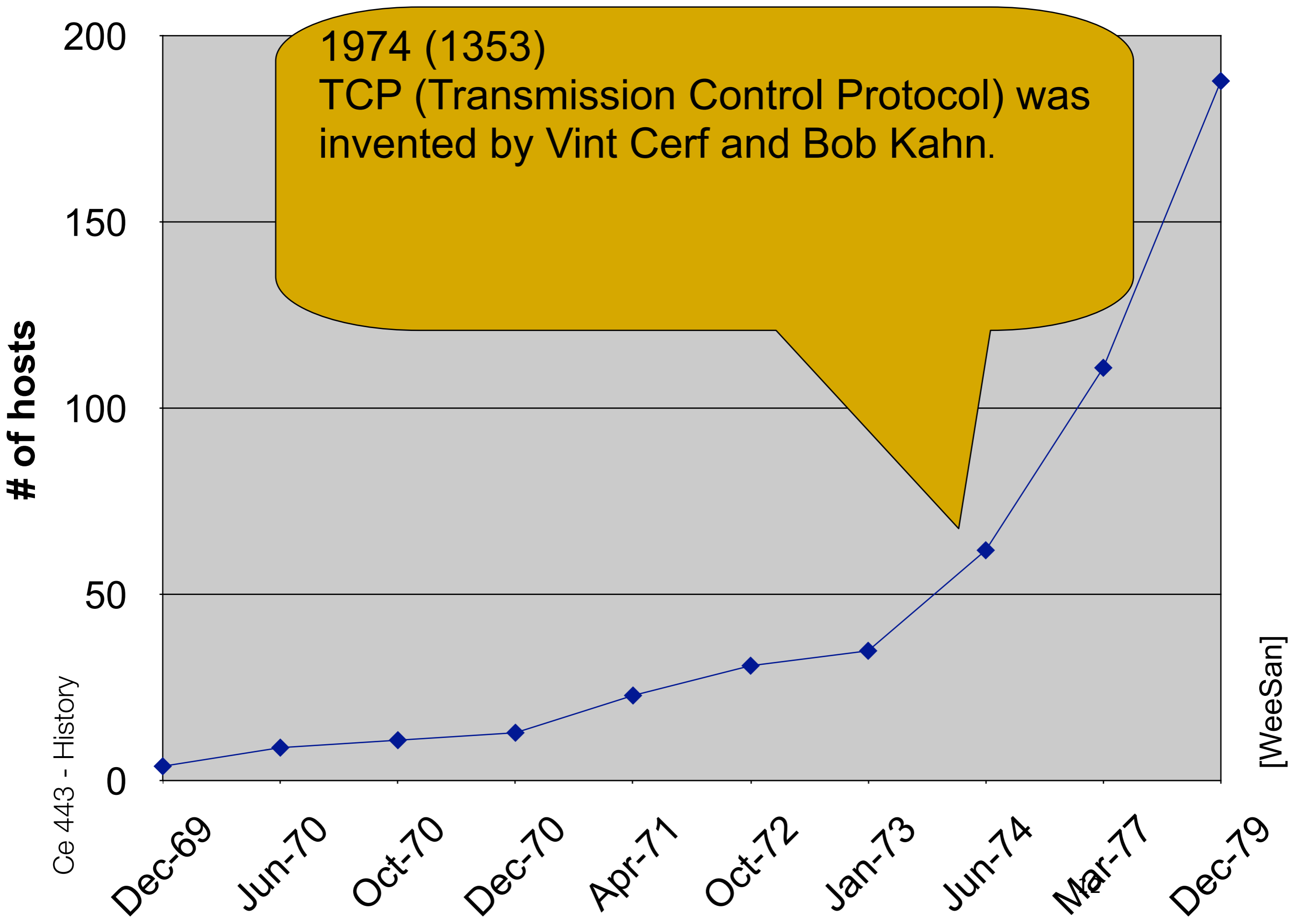
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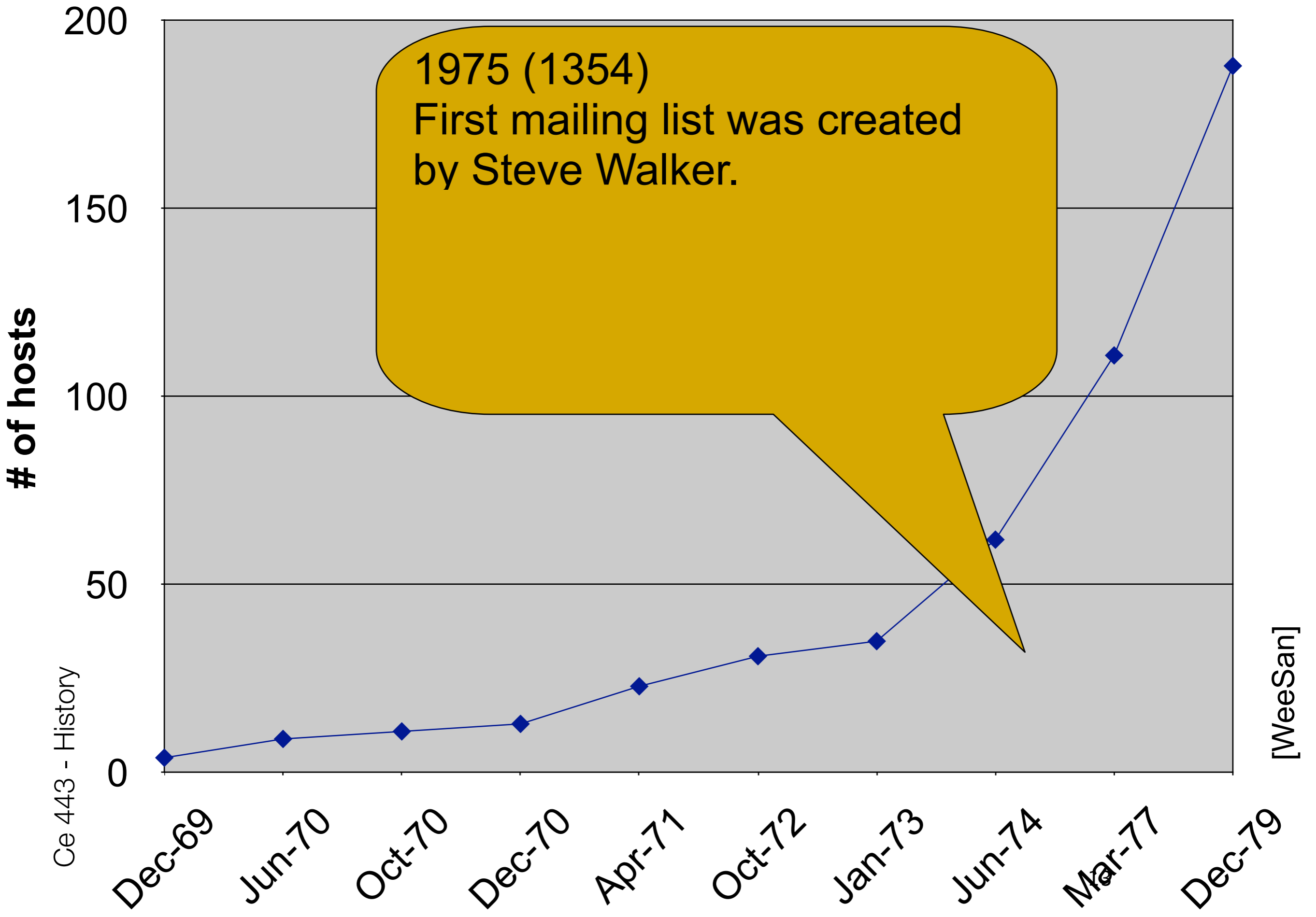
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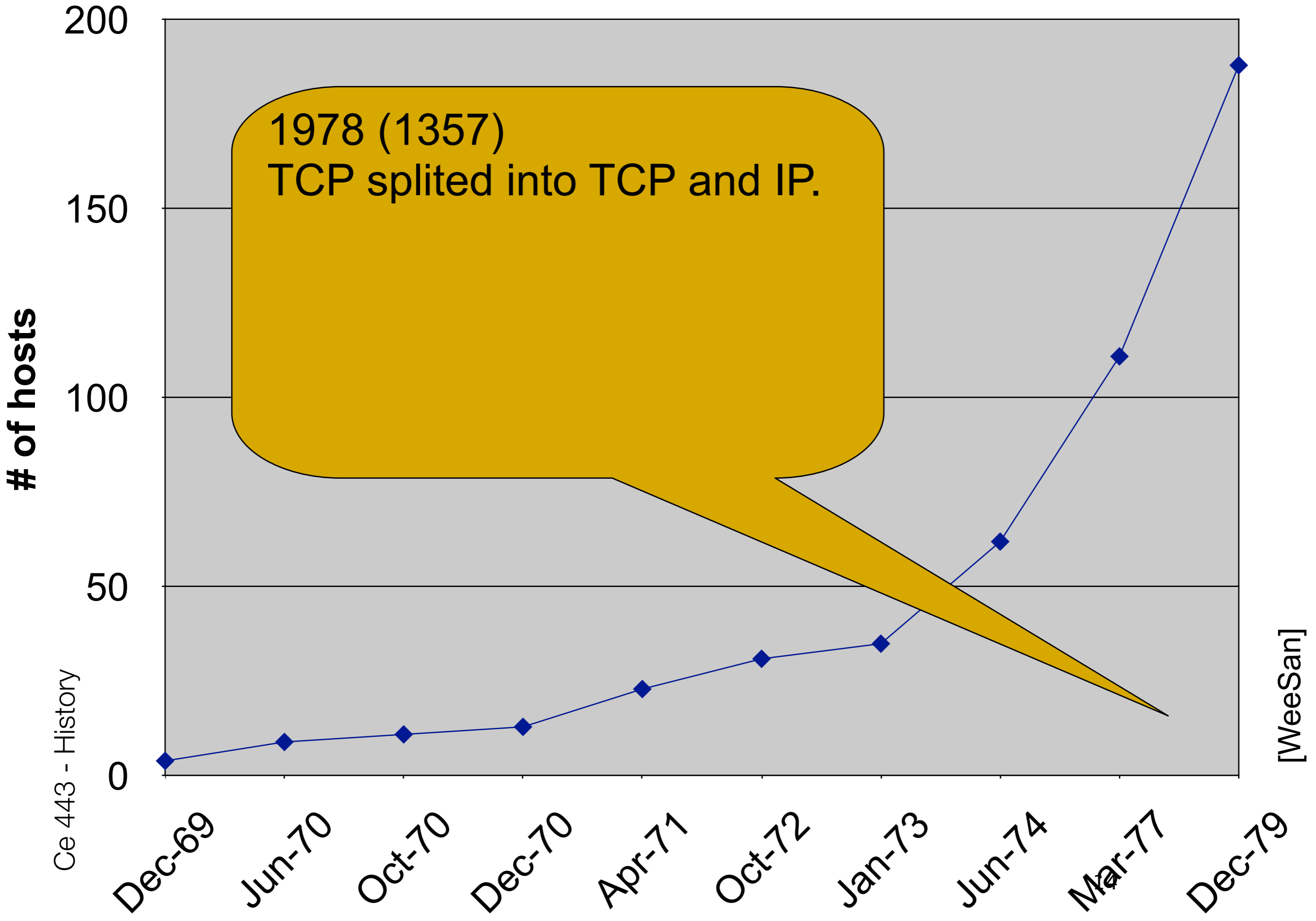
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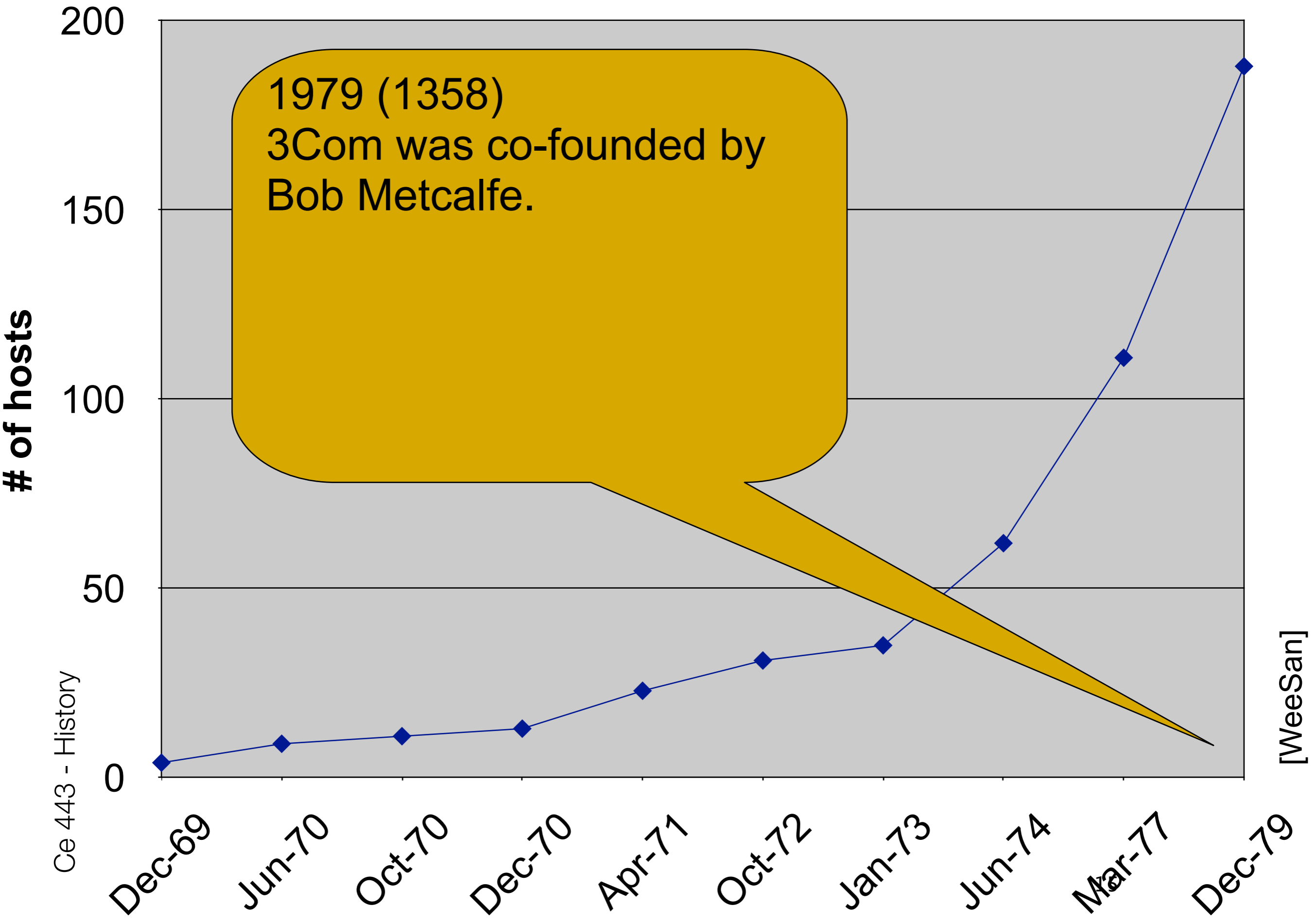
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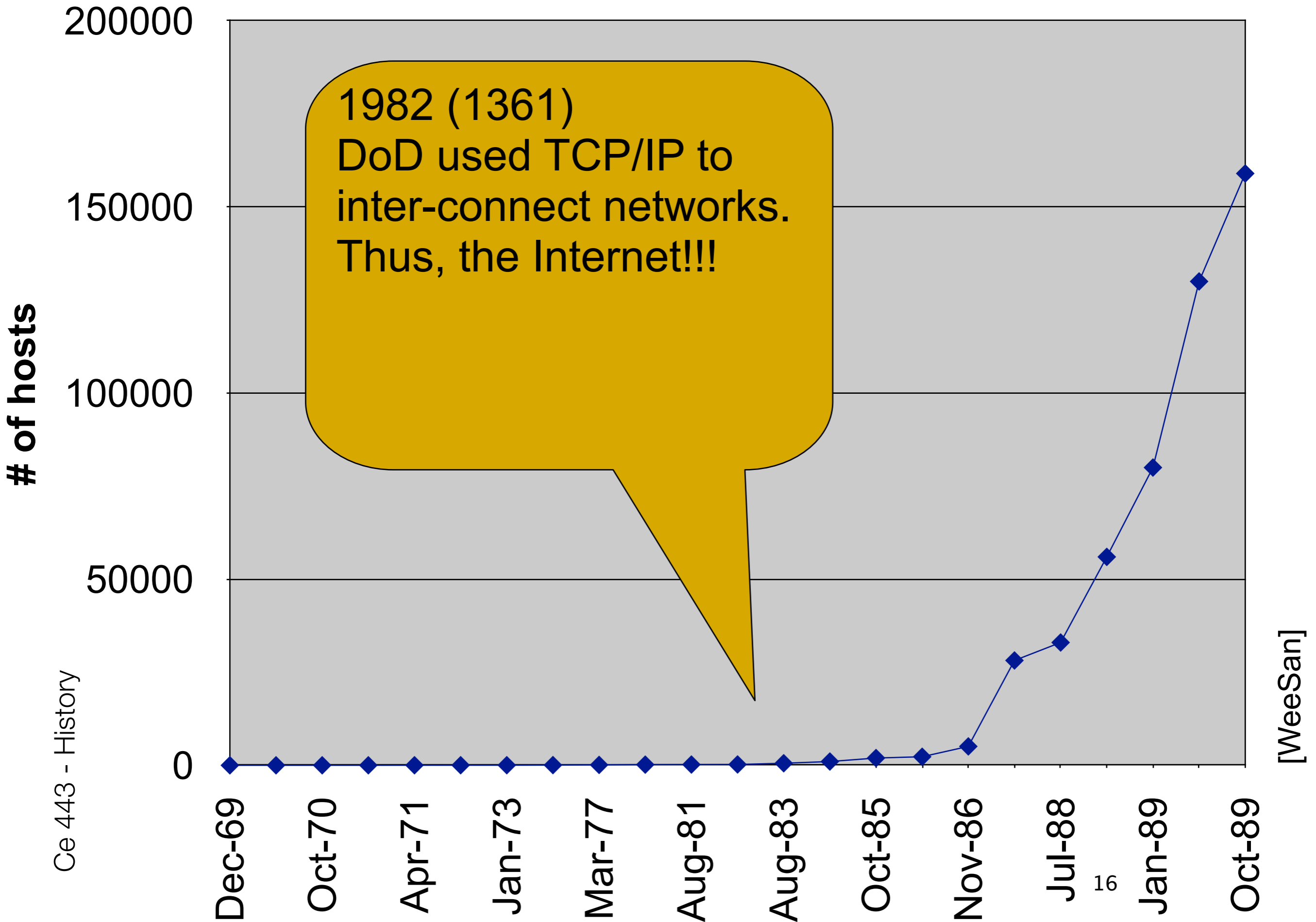
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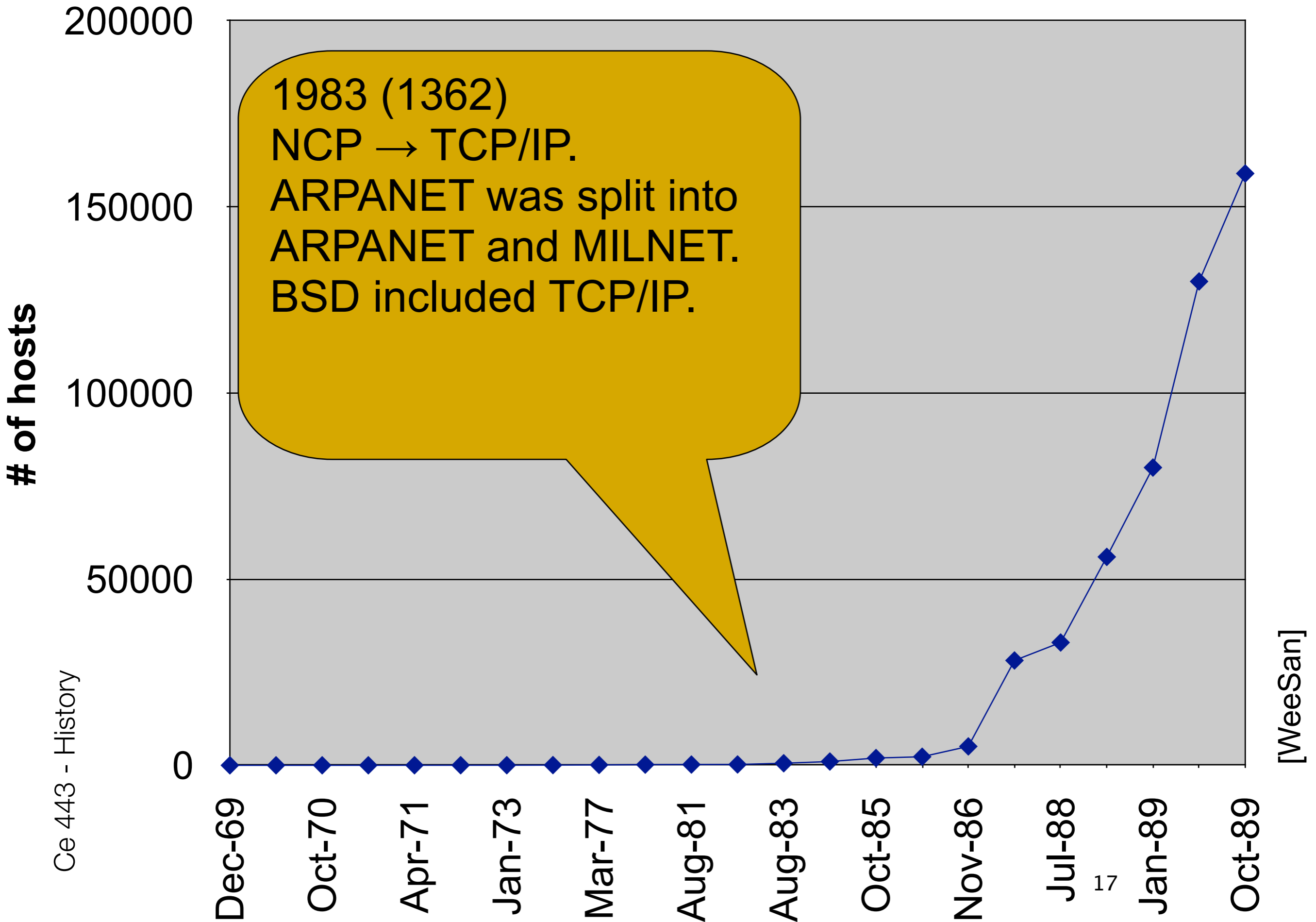
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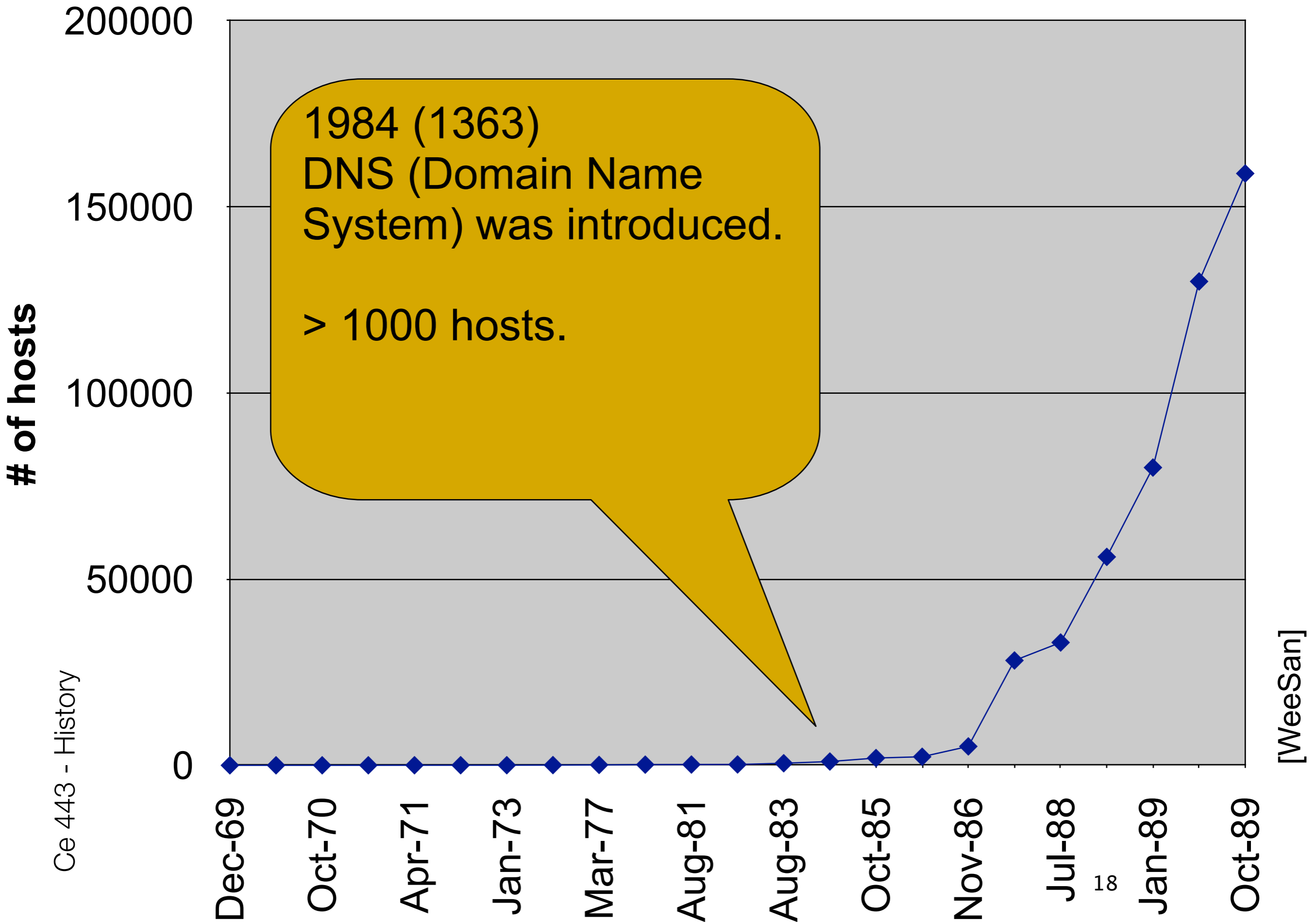
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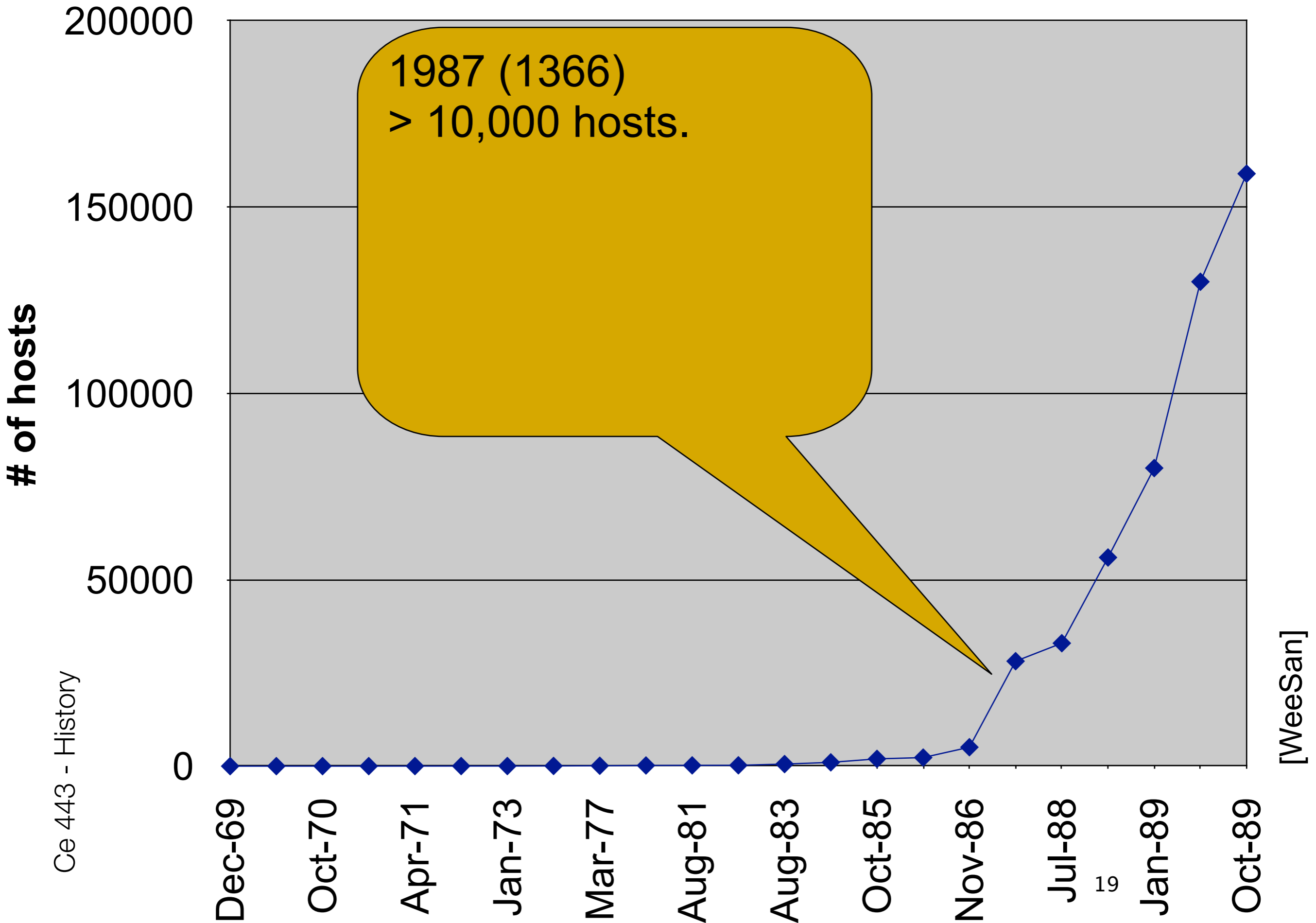
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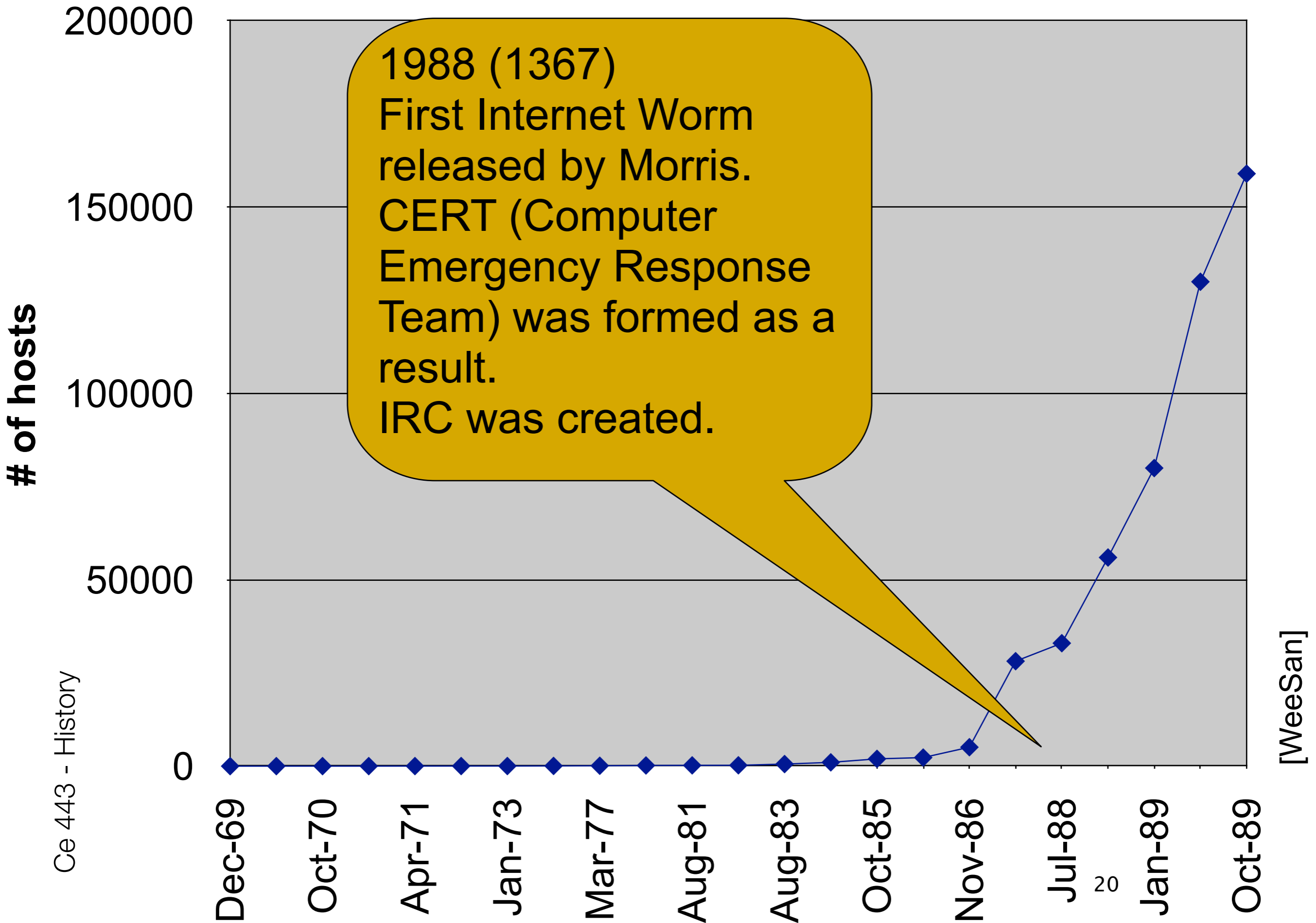
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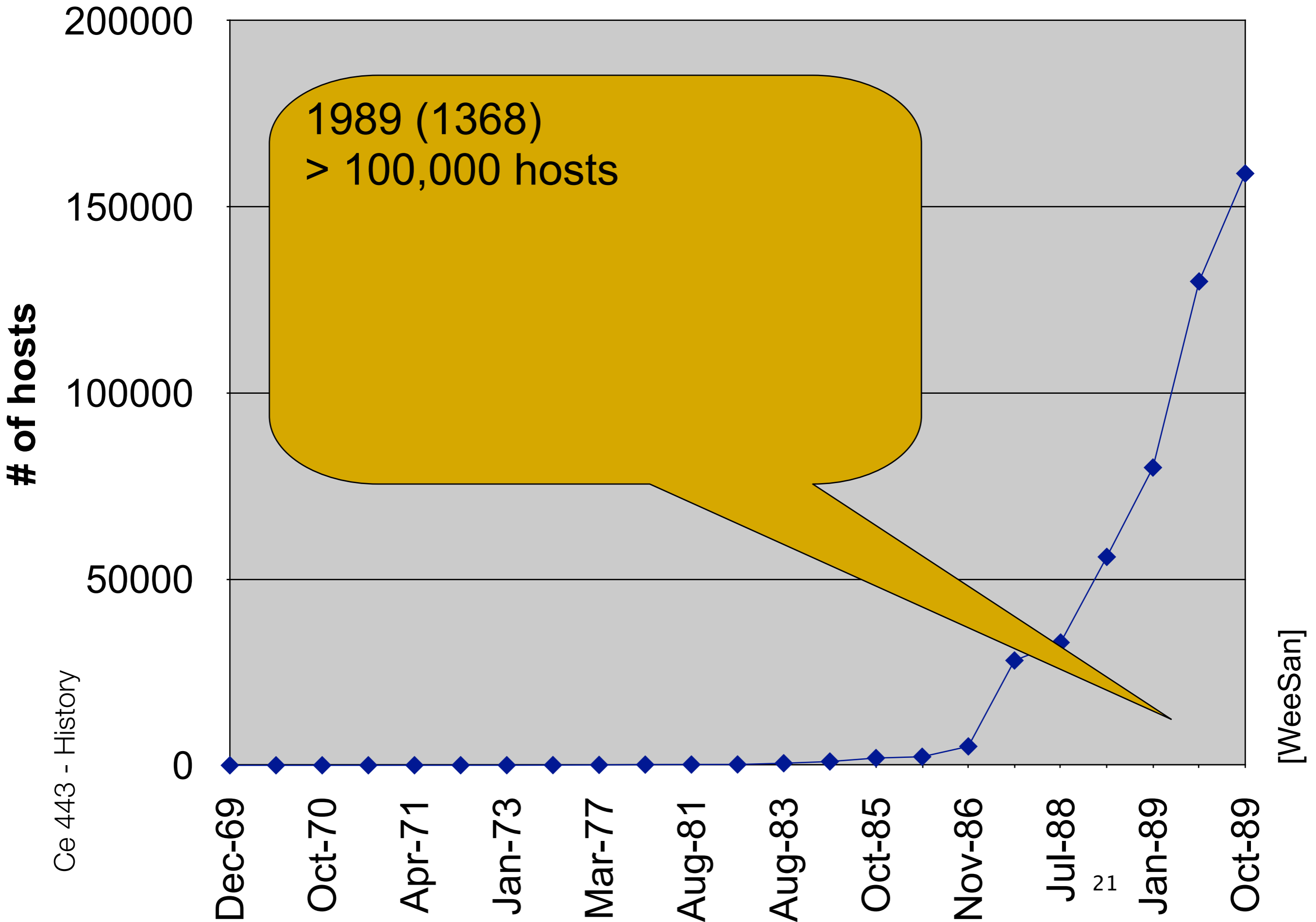
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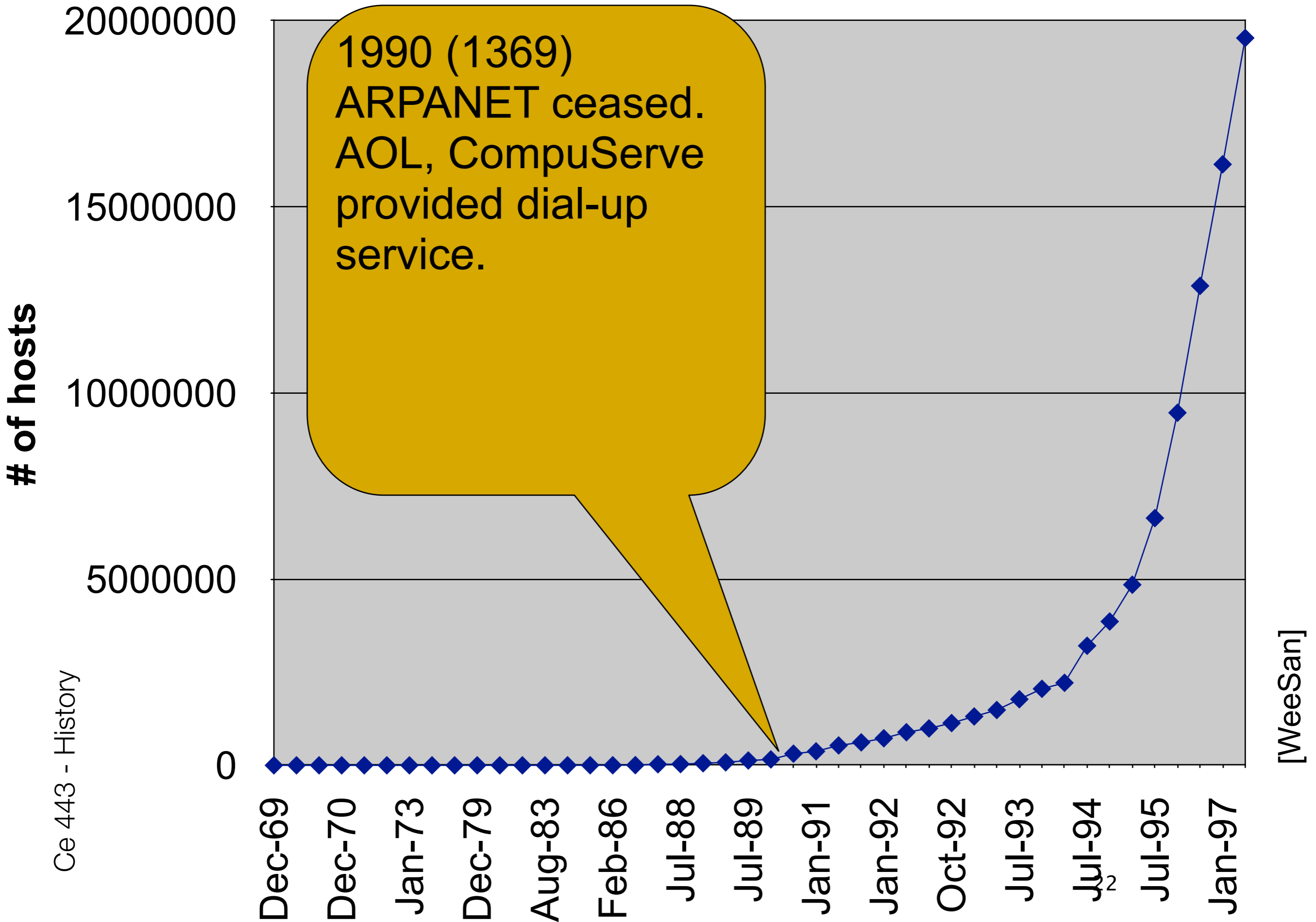
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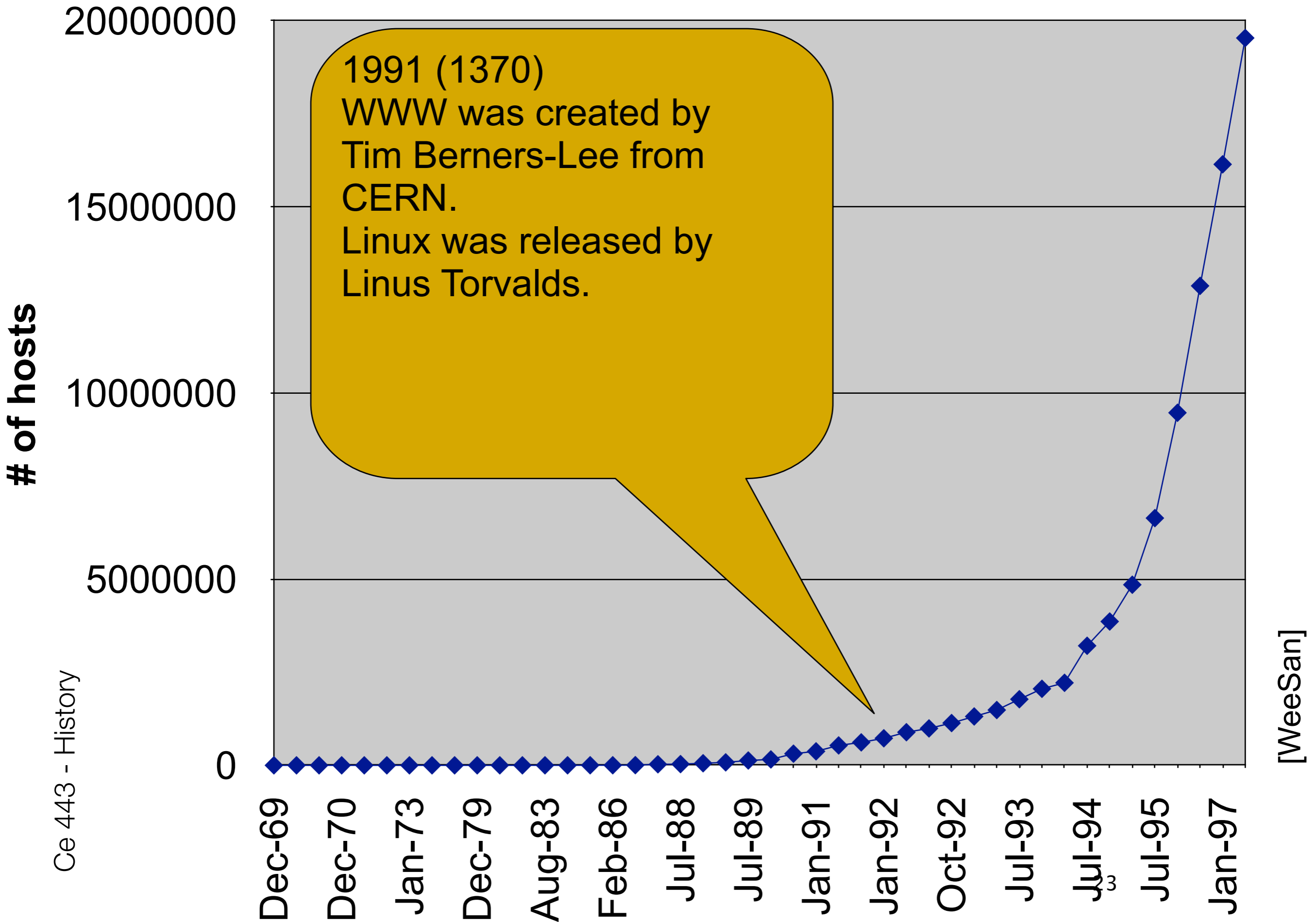
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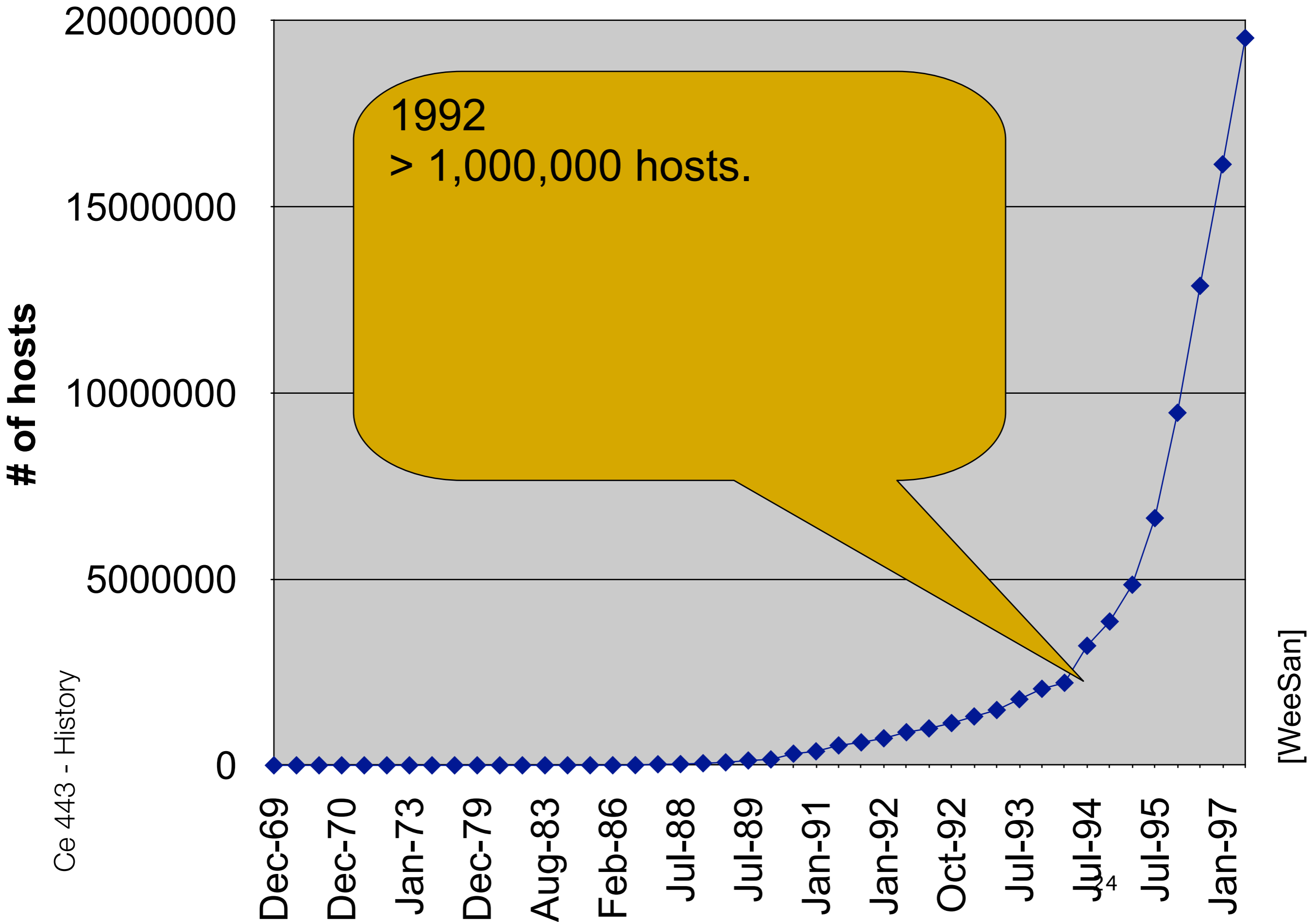
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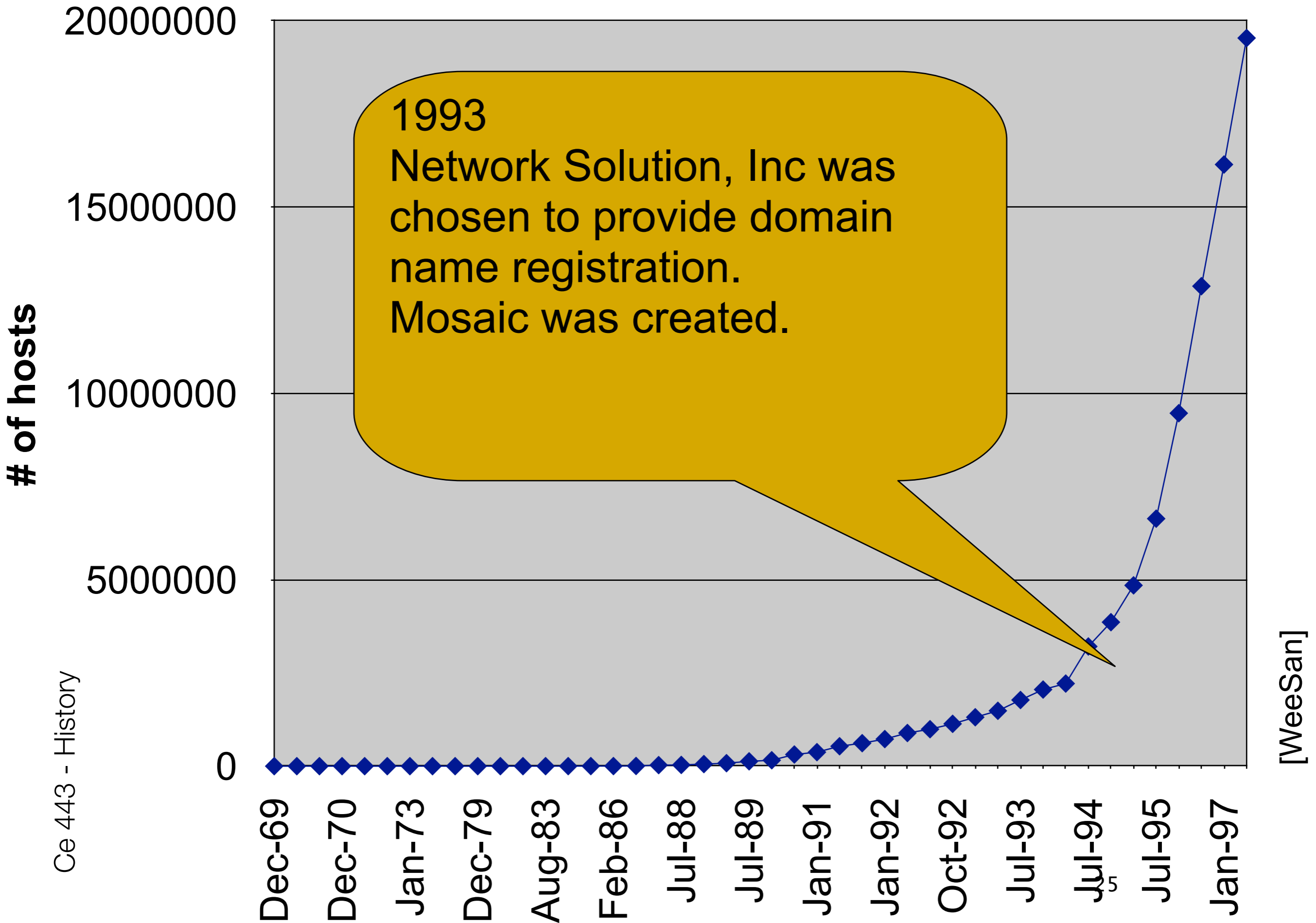
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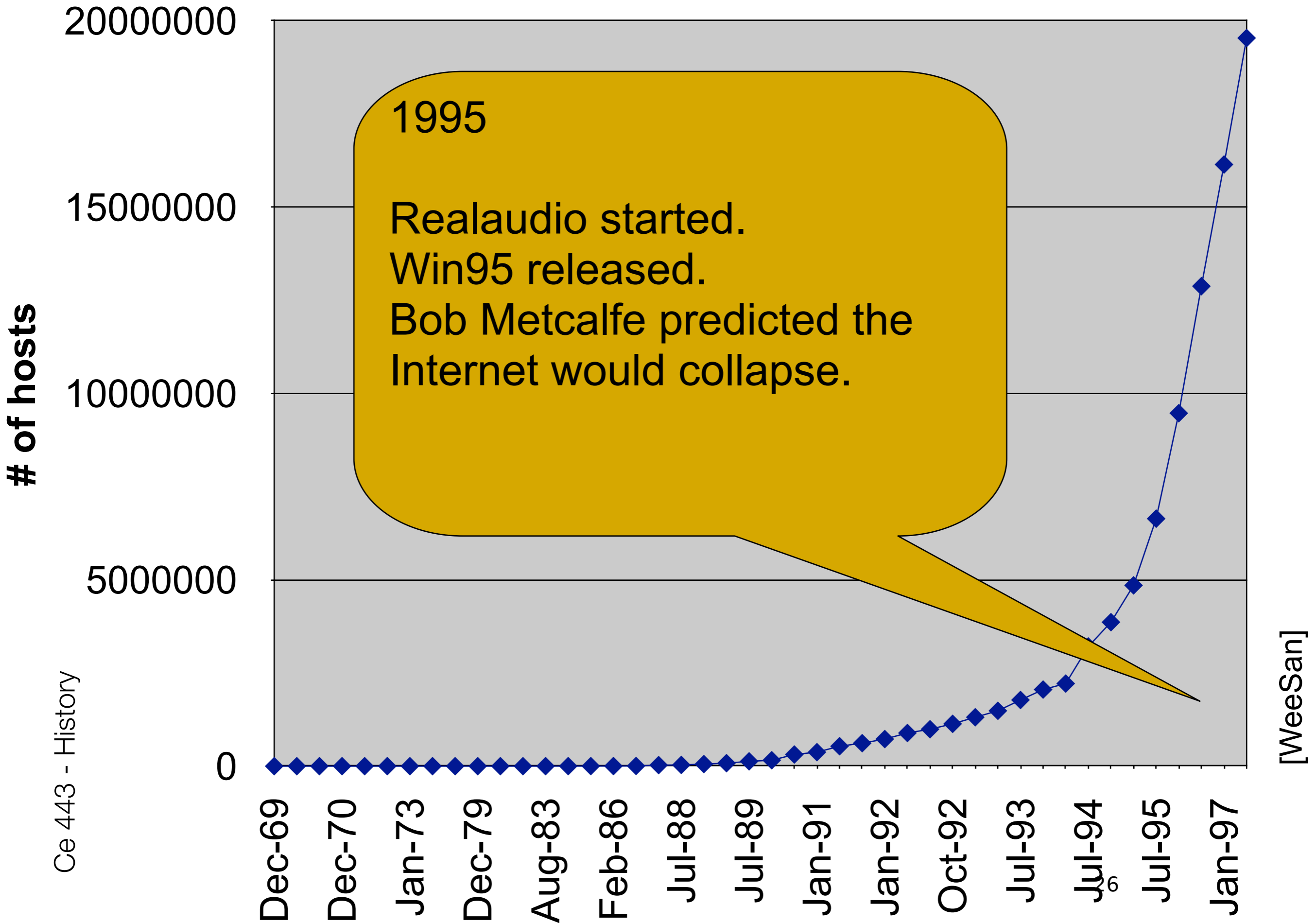
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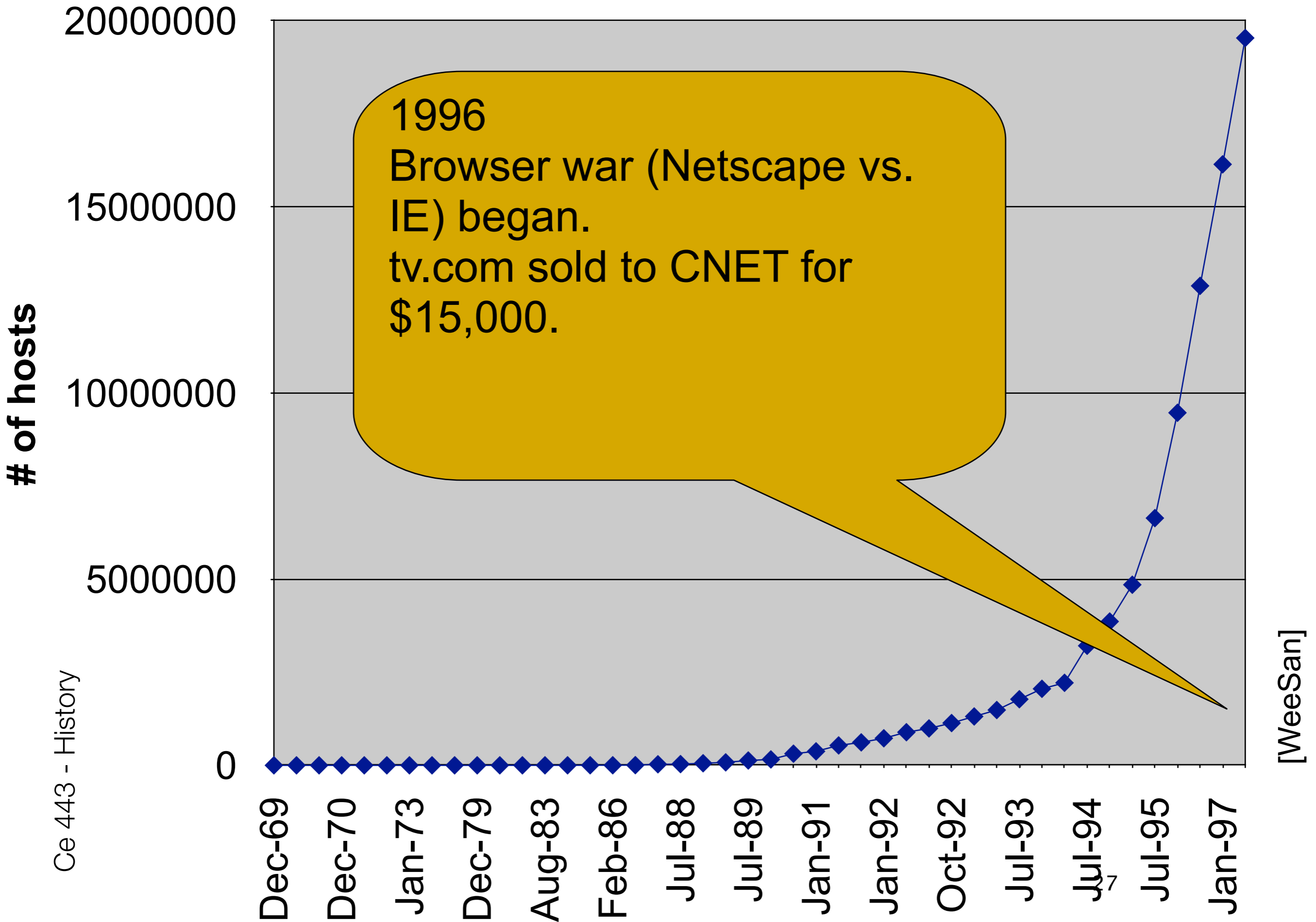
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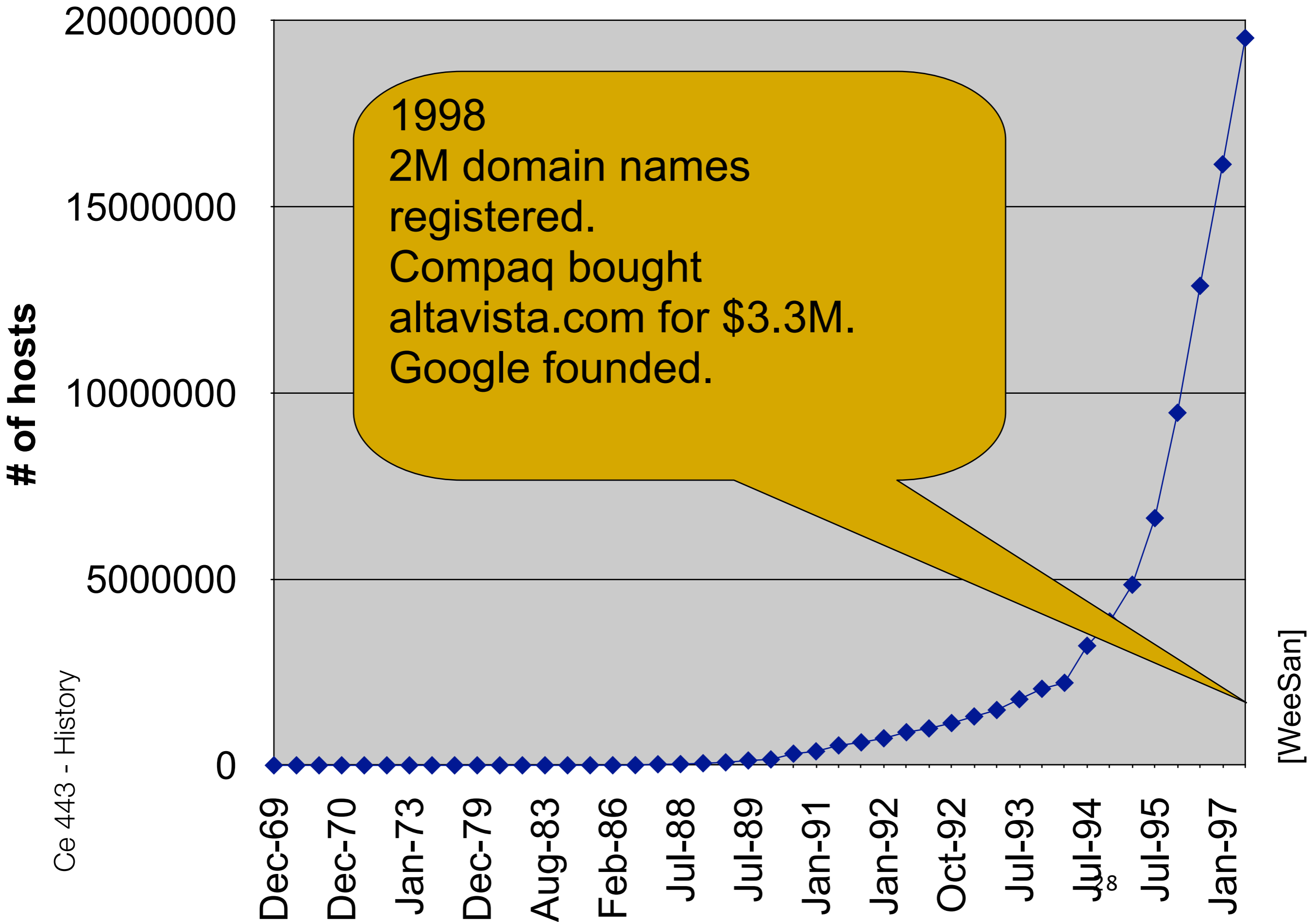
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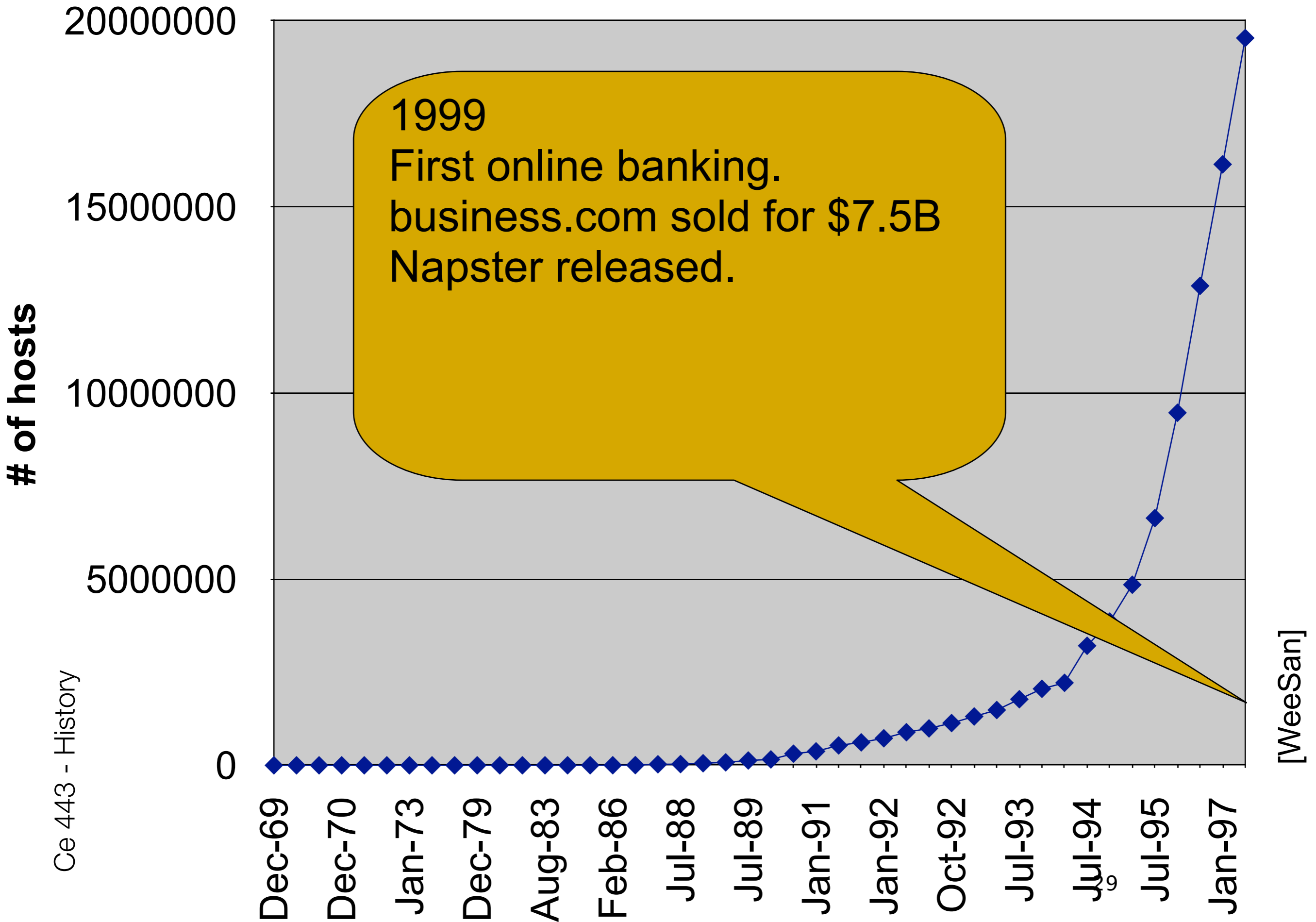
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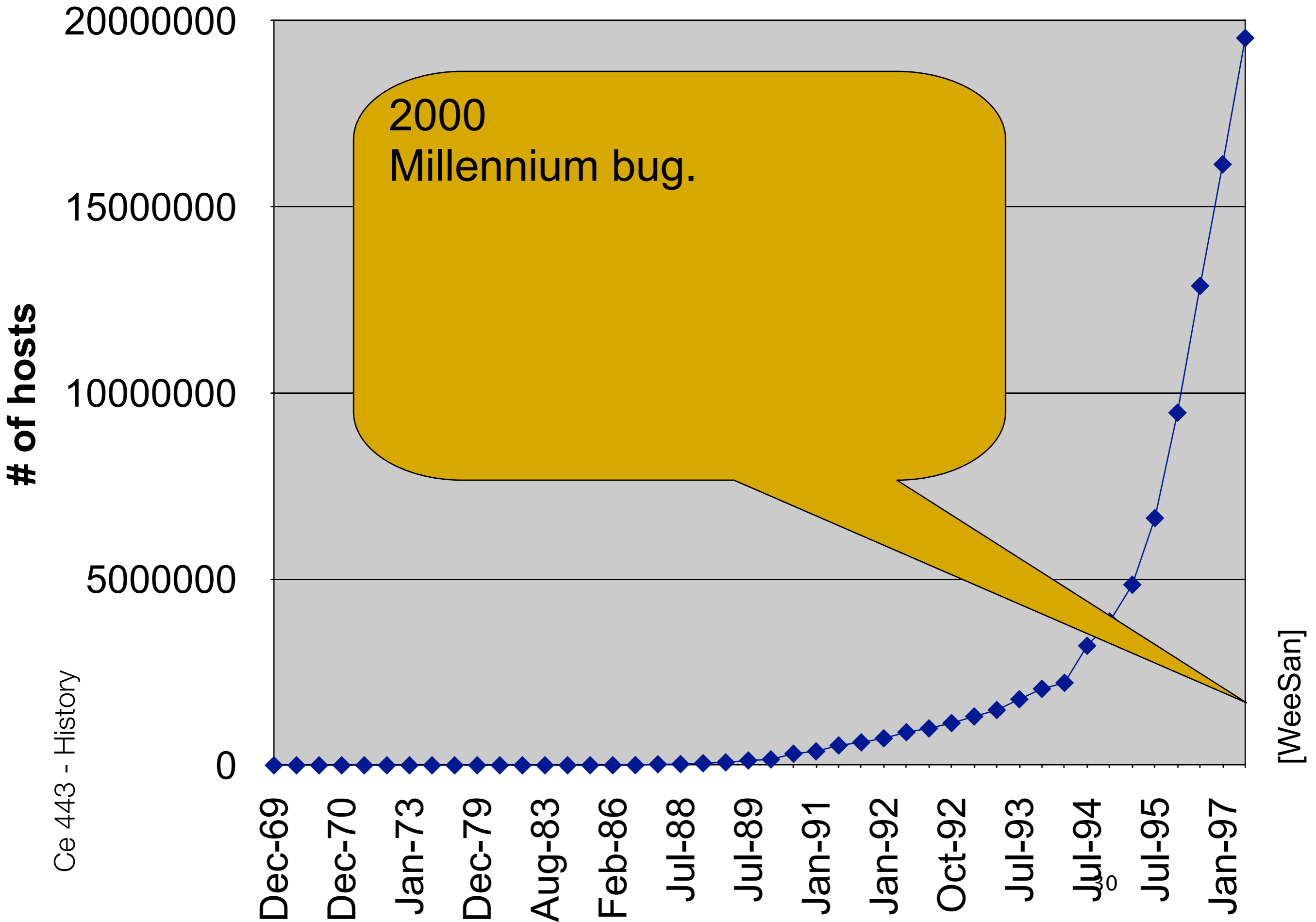
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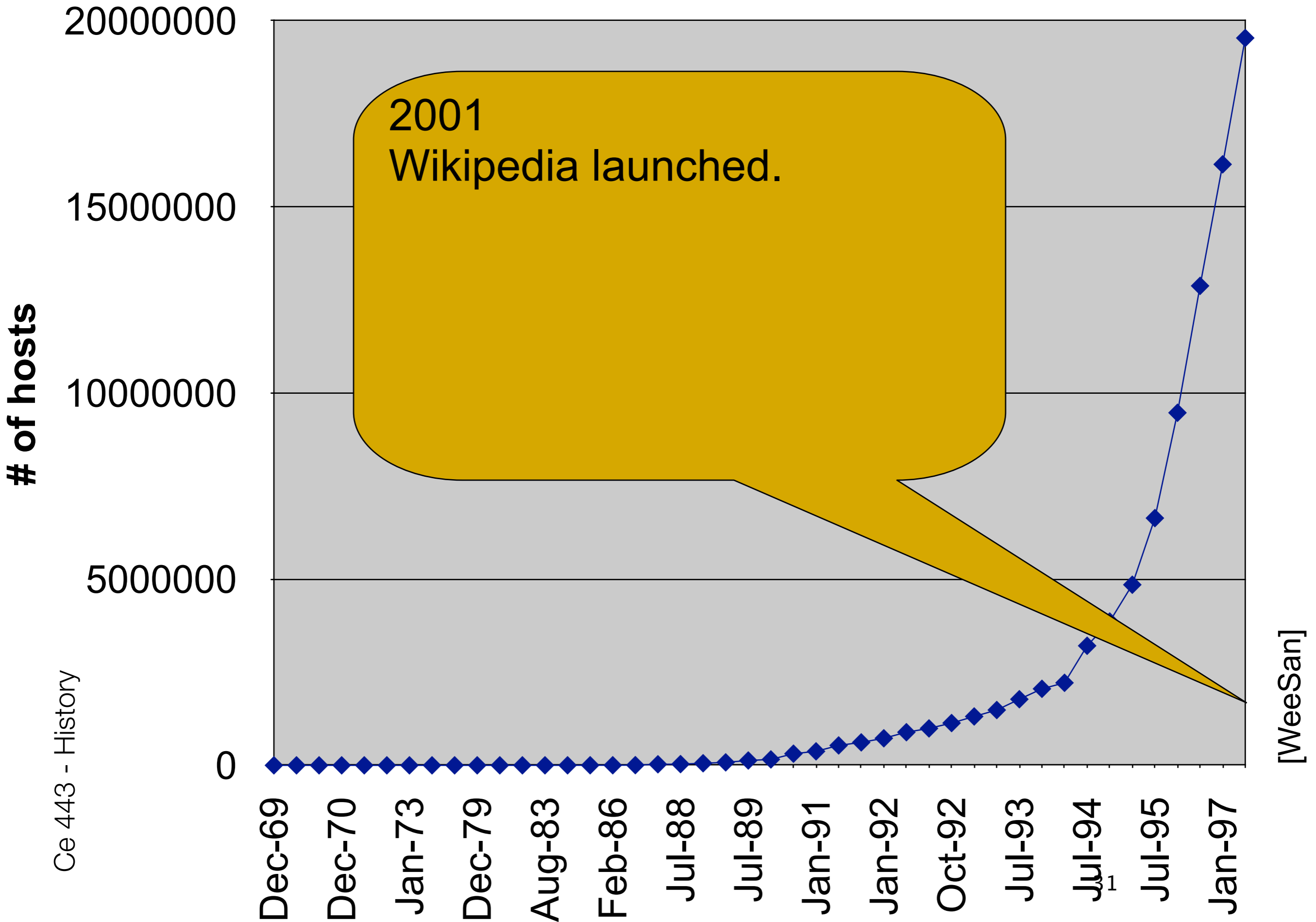
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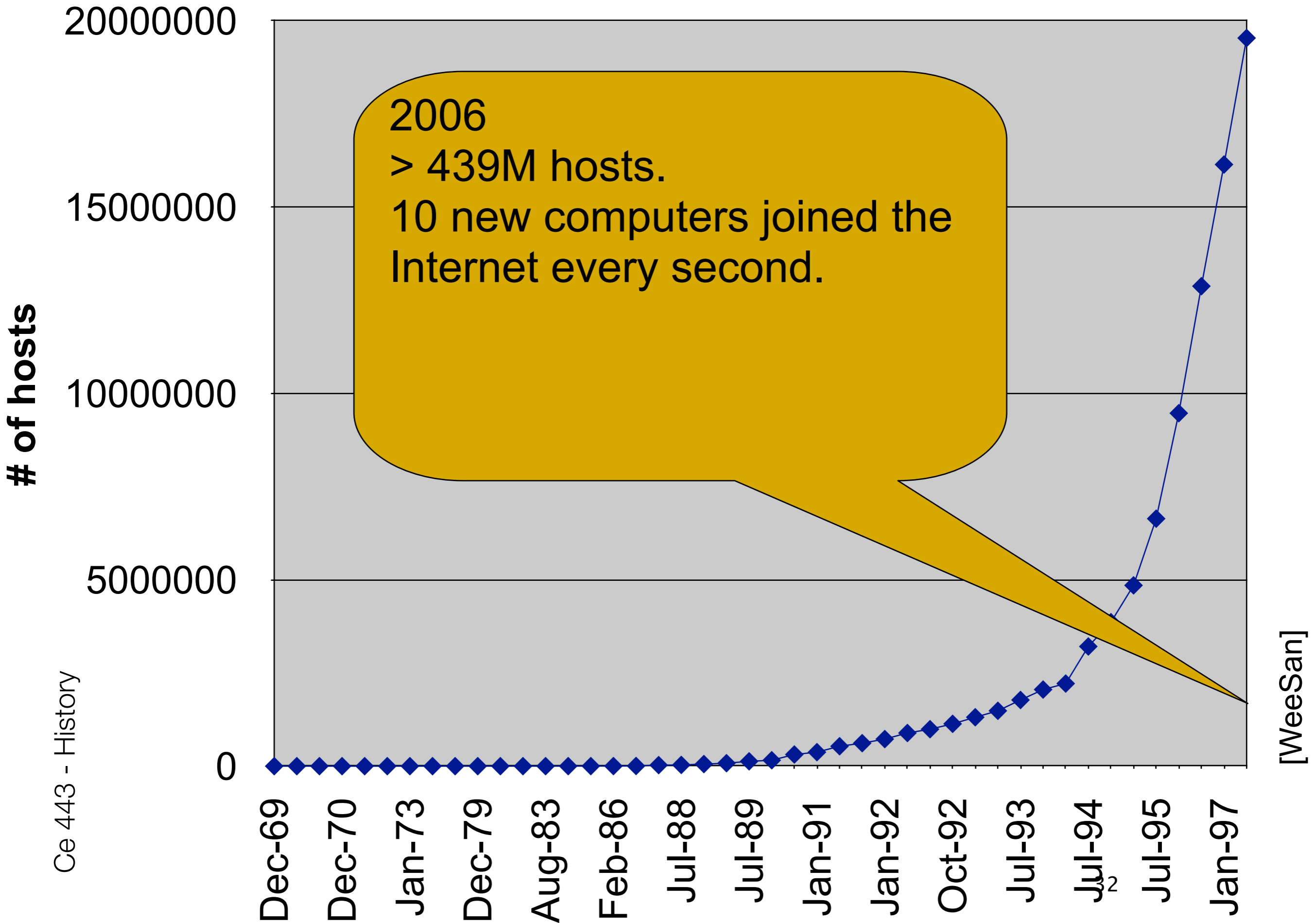
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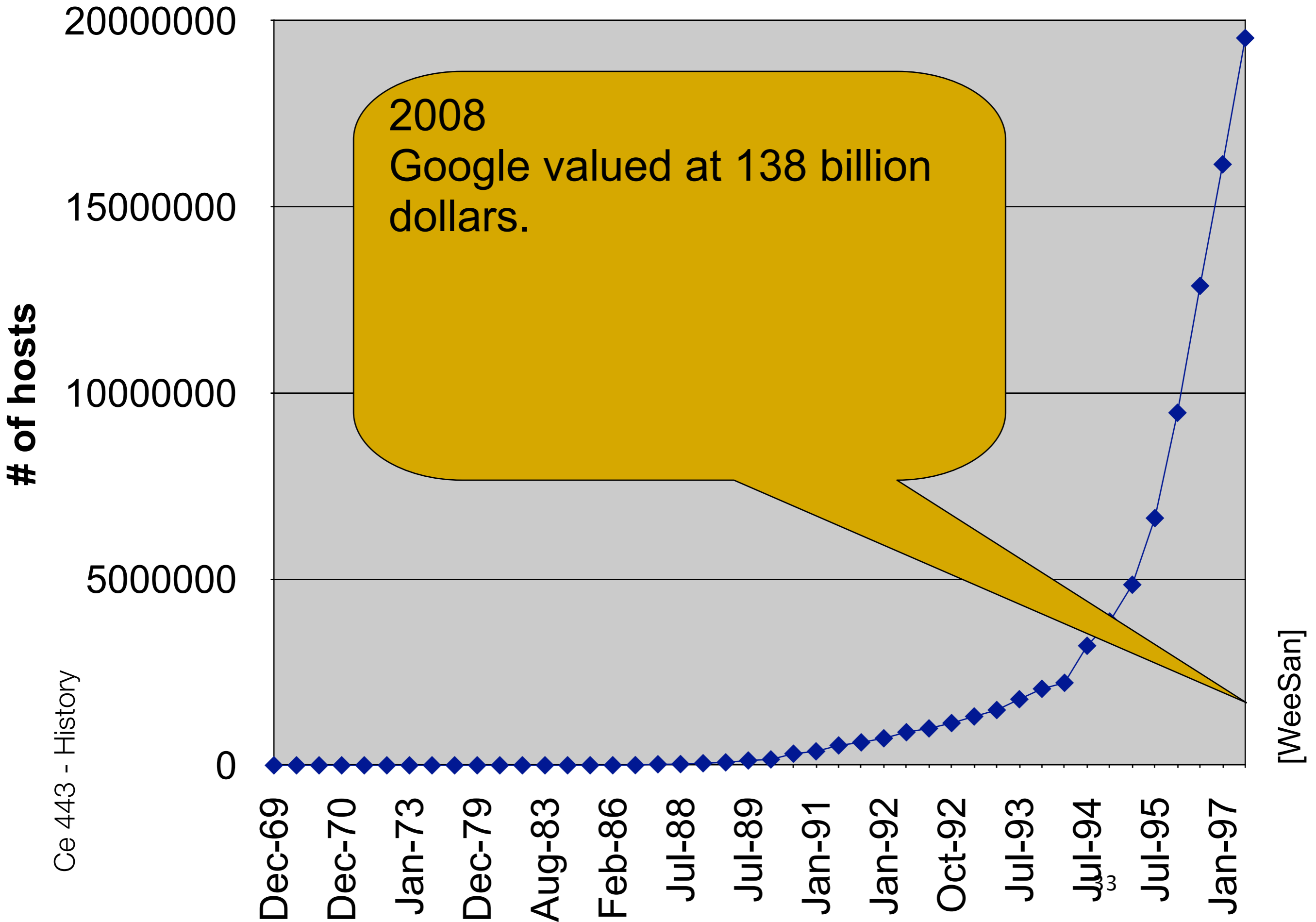
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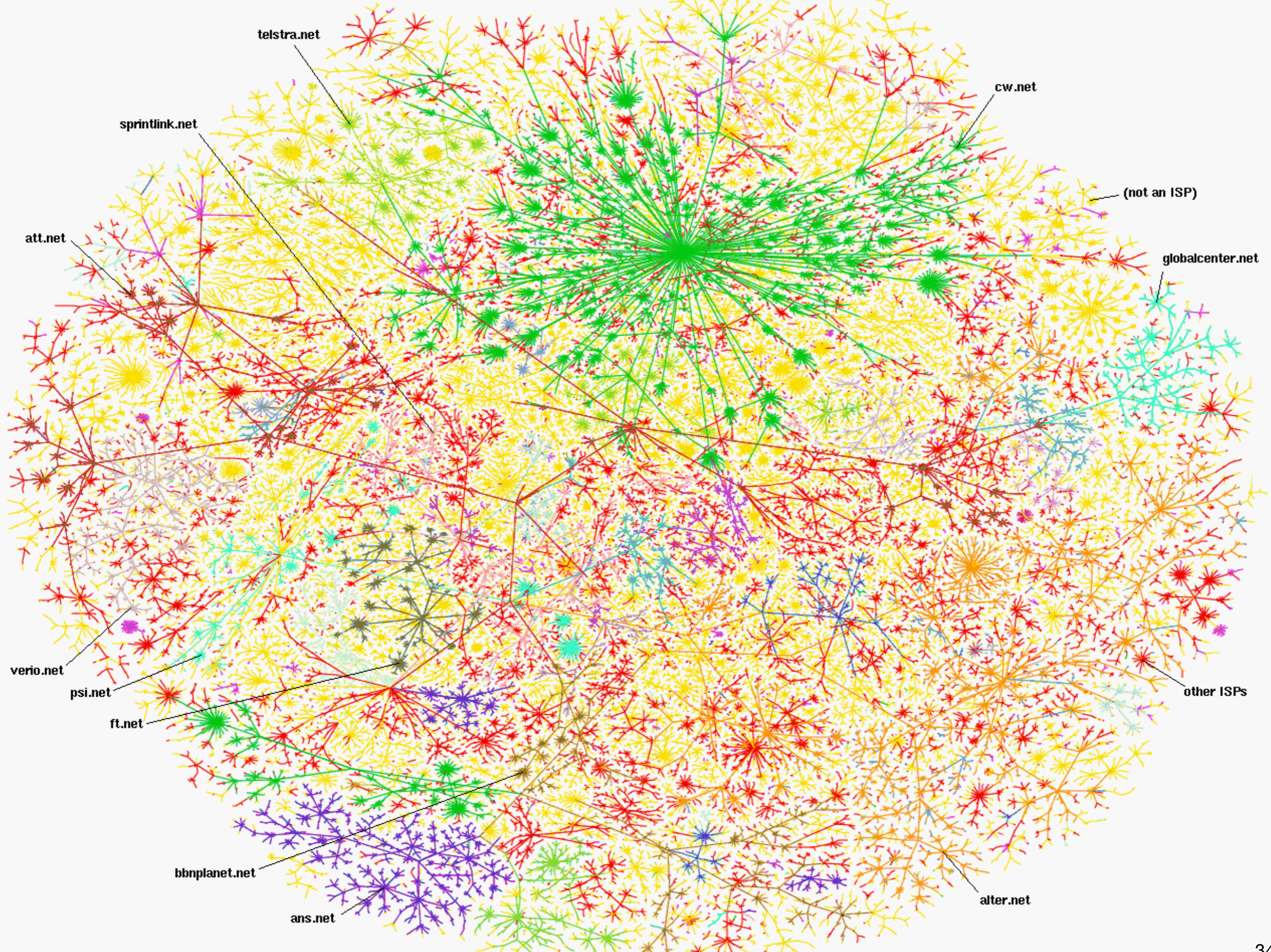


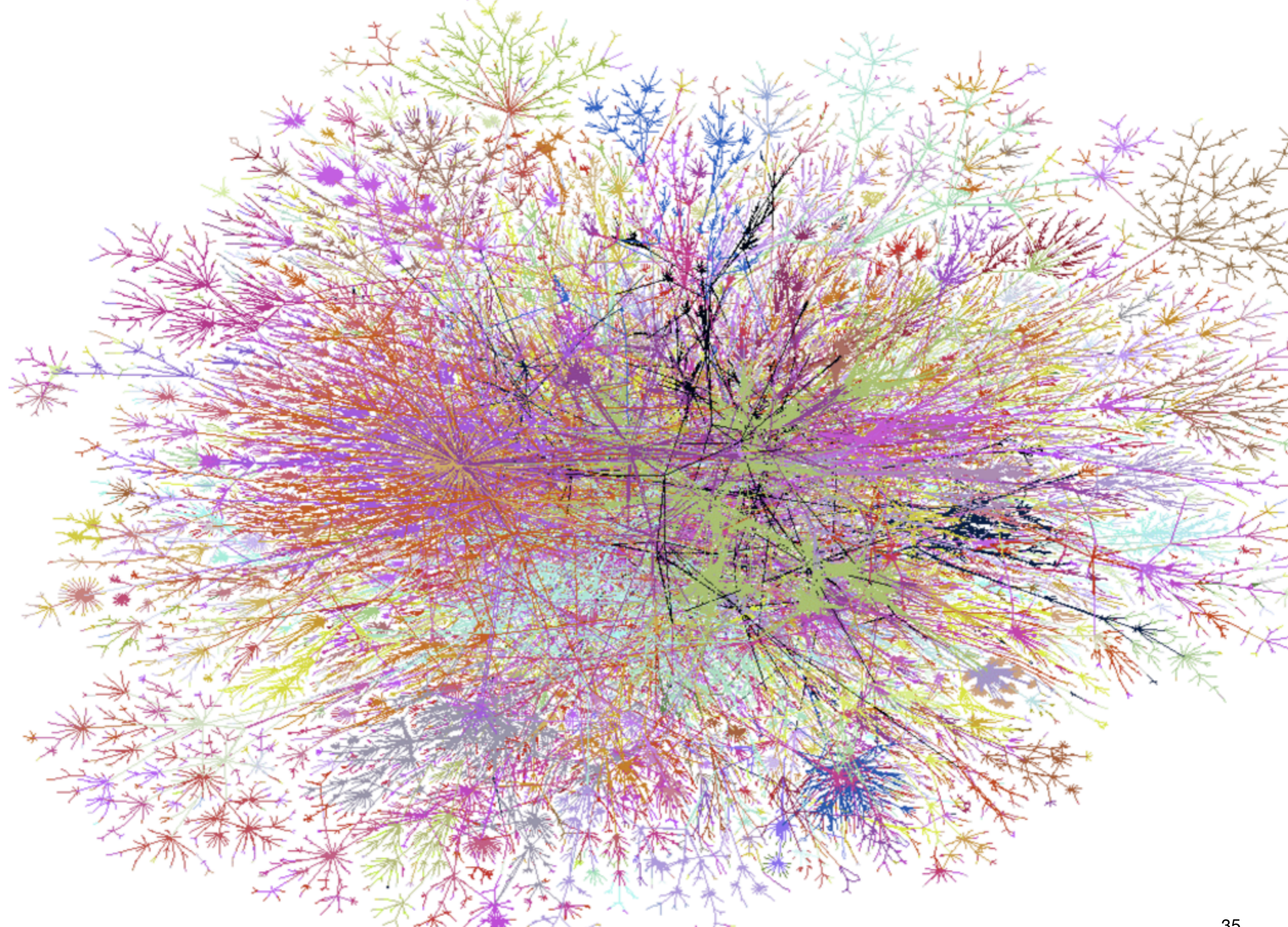
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Internet Hosts

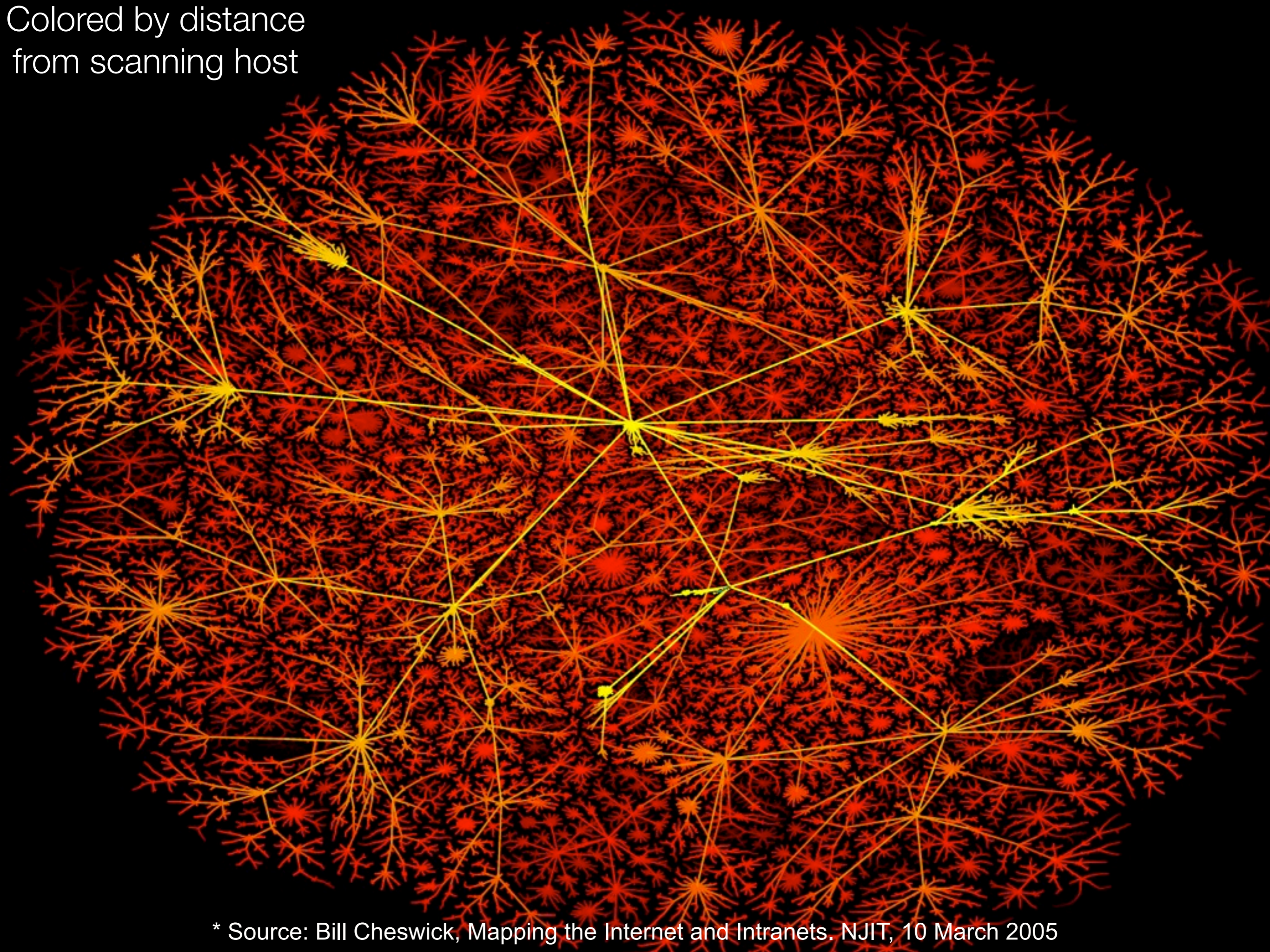






* Source: Bill Cheswick, Mapping the Internet and Intranets. NJIT, 10 March 2005

Colored by distance
from scanning host



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Today's Networks

- What are common applications?
 - Web
 - Email
 - Video Streaming
 - file sharing (p2p)
 - Gaming
 - e-commerce
 - VoIP

Details on the Course



Administrivia

- Website:
 - sharif.edu/~kharrazi/courses/40443-921/
 - You are expected to check the website regularly
- Textbook:
 - Computer Networks: A Systems Approach (Fourth Edition), by Larry L. Peterson, Bruce S. Davie, March 2007.
- Prerequisites: 40-181 Probability and Statistics
- Corequisites: 40-424 Operating Systems
- You must also take, 40-416 with 40-443



Administrivia

- TAs
 - Behnam Momeni
 - Ali Fattaholmanan
 - Roozbeh Ketabi
 - Mina Tahmasbi
 - Roohy Shemirani
 - Morteza Ramezani
- Grading
 - 10% quiz
 - 40% homework
 - 20% midterm
 - 30% final



Policies

- Late Homework
 - One day late will cost you 25%, two days 50%, and three days 75%.
 - No homework will be accepted after the third day.
- Cell phones
 - Please turn them off before entering class.
- Cheating and Copying
 - First time you are caught you will get a zero for the task at hand.
 - Second time you are caught you will fail the course.
 - Providing your assignment to someone else is considered cheating on your behalf.



Acknowledgments/References

- [WeeSan] History of the Internet, WeeSan Lee weesan@cs.ucr.edu, www.cs.ucr.edu/~weesan/cs6/01_history_of_the_internet.ppt
- [Zhang07] Hui Zhang, 15-441 Networking, Fall 2007, School of computer science, CMU.
- [Peterson07] Computer Networks: A Systems Approach (Fourth Edition), by Larry L. Peterson, Bruce S. Davie, March 2007.