



Grace Hopper

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Grace Murray Hopper



Rear Admiral Grace M. Hopper, USN, Ph.D.

Nickname(s) "Amazing Grace"

Born December 9, 1906, New York City, New York, U.S.

Died January 1, 1992 (aged 85), [Arlington, Virginia](#), U.S.

Place of burial [Arlington National Cemetery](#)

Service/branch  [United States Navy](#)

Years of service 1943–1966, 1967–1971, 1972–1986

Rank  [Rear admiral \(lower half\)](#)

 [Defense Distinguished Service Medal](#)

 [Legion of Merit](#)

 [Meritorious Service Medal](#)

Awards  [American Campaign Medal](#)

 [World War II Victory Medal](#)

 [National Defense Service Medal](#)

 [Armed Forces Reserve Medal](#) with two [Hourglass Devices](#)

 [Naval Reserve Medal](#)

Grace Murray Hopper (December 9, 1906 – January 1, 1992) was an American [computer scientist](#) and [United States Navy rear admiral](#).^[1] She was one of the first programmers of the [Harvard Mark I](#) computer in 1944,^[2] invented the first [compiler](#) for a computer programming language,^{[3][4][5][6][7]} and was one of those who popularized the idea of machine-independent programming languages which led to the development of [COBOL](#), one of the first [high-level programming languages](#). She is credited with popularizing the term "[debugging](#)" for fixing computer glitches (in one instance, removing a moth

from a computer[8]). Owing to her accomplishments and her naval rank, she is sometimes referred to as "[Amazing Grace](#)".[9][10] The U.S. Navy Arleigh Burke class guided-missile destroyer [USS Hopper \(DDG-70\)](#) is named for her, as was the [Cray XE6](#) "Hopper" supercomputer at [NERSC](#).



Hopper's signatures on a duty officer sign-up sheet for the Bureau of Ships Computation Project at Harvard, which built and operated the Mark I



Grace Murray Hopper at the UNIVAC keyboard, c. 1960



Photo of "first [computer bug](#)"

Throughout much of her later career, Grace Hopper was much in demand as a speaker at various computer-related events. She was well known for her lively and irreverent speaking style, as well as a rich treasury of early war stories. She also received the nickname "Grandma COBOL".

- While she was working on a [Mark II](#) Computer at a US Navy research lab in Dahlgren, Virginia in 1947, her associates discovered a [moth](#) stuck in a [relay](#) and thereby impeding operation, whereupon she remarked that they were "[debugging](#)" the system. Though the term [bug](#) had been in use for many years in engineering[51][52] to refer to small glitches and inexplicable problems, Admiral Hopper did bring the term into popularity.[53] The remains of the moth can be found in the group's log book at the [Smithsonian Institution's National Museum of American History](#) in [Washington, D.C.](#)[54]
- Grace Hopper is famous for her nanoseconds visual aid. People (such as generals and admirals) used to ask her why [satellite](#) communication took so long. She started handing out pieces of wire that were just under one foot long (11.80 inches)—the distance that light travels in one [nanosecond](#). She gave these pieces of wire the [metonym](#) "nanoseconds." [27] She was careful to tell her audience that the length of her nanoseconds was actually the maximum speed the signals would travel in a vacuum, and that signals would travel more slowly through the actual wires that were her teaching aids. Later she used the same pieces of wire to illustrate why computers had to be small to be fast. At many of her talks and visits, she handed out "nanoseconds" to everyone in the audience, contrasting them with a coil of wire nearly a thousand feet long, representing a [microsecond](#). Later, while giving these lectures while working for DEC, she passed out packets of pepper, calling the individual grains of ground pepper [picoseconds](#).

Jay Elliot described Grace Hopper as appearing to be "'all Navy', but when you reach inside, you find a 'Pirate' dying to be released".[55]