

# A Brief History of Early Text Editors

How they evolved into what they are now

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# Terminology

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- Computer

Anything that aids in performing calculations

- Computer

Anything that aids in performing calculations

- Believe it or not, “computers” actually predate the useful application of electricity by thousands of years
- The word computer actually has a much broader meaning than what we think of today
- Until around a hundred years ago, a computer could be anything, from a tool to a person, that aided in performing calculations [7]

# Terminology

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- Computer

Anything that aids in performing calculations

- Text editor

Interface used to write programs that control computer's actions

# Early Text Editors

└ Introduction

└ Terminology

└ Terminology

- Computer  
*Anything that aids in performing calculations*
- Text editor  
*Interface used to write programs that control computer's actions*

- What we think of today as a text editor didn't exist in any kind of capacity back then
- However, at some point computers became “programmable”
- In a broad sense, we can call the interfaces used to write programs for these early computers text editors
- We can trace the origins of modern text editors through these early computers and their text editors

## Early Programming

- Need a way to write repeatable, configurable programs that require minimal human interaction to run

## Early Text Editors

└ Punch cards

└ Mechanical computers

└ Early Programming

- Need a way to write repeatable, configurable programs that require minimal human interaction to run

- But before we can start using text editors, we need to have a reliable way to store programs
- Being able to store programs is very important: storing programs vastly reduces the amount of human oversight required by computer operators
- The first way computer programs were stored? On paper.

## Early Programming

- Need a way to write repeatable, configurable programs that require minimal human interaction to run
- First programs for computers were used to store weaving patterns around 265 BVE<sup>1</sup>
- Stored as holes punched in pieces of paper or wood

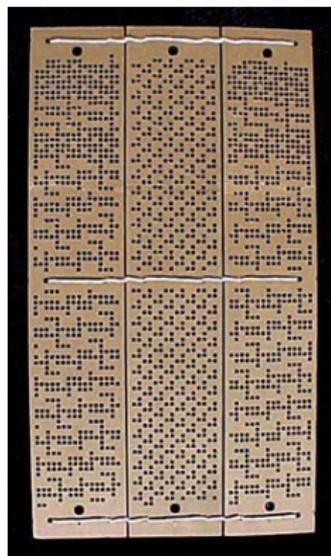


Figure 1: Example program for Jacquard loom [8]

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<sup>1</sup> Also known as 1725

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Figure 1: Example program for Jacquard loom [8]

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- The first instance of a program comes from a very unlikely place - the French fabric industry in the 1700s, or about 265 years before Vim
- The first programs for computers were used to store woven patterns, moving parts of the loom to create the desired design
- These programs were stored on pieces of paper or wood, with holes punched in them the represented the pattern
- Although today they are known as “Jacquard looms,” several other inventors actually had a hand in the development of the loom - Jacquard combined the best of their ideas into the final product

## Jacquard Loom - Video



Figure 2: **Video:** Loom History Moving to Computer - *Hughes Math* [9]

## Early Text Editors

└ Punch cards

└└ Jacquard loom

└└└ Jacquard Loom - Video



Figure 2: Video: Loom History Moving to Computer - Hughes Math [9]

- This video shows the evolution and development of the Jacquard loom
- For another video that maybe makes it more clear what the punched cards are doing, see <https://www.youtube.com/watch?v=K6NgMNvK52A>

## Jacquard Loom Text Editor



**Figure 3:** A Jacquard card punch, the tool used to “program” the Jacquard loom [10]

## Early Text Editors

└ Punch cards

└─ Jacquard loom

└─ Jacquard Loom Text Editor



Figure 3: A Jacquard card punch, the tool used to "program" the Jacquard loom [10]

- As you saw in the video, programs were written for the Jacquard loom on wood or paper, using sophisticated mechanical tools, like seen here
- These cards worked very well for producing fabric, and revolutionized the process of producing woven goods
- There are downsides to this text editor:
  - If you make a mistake, the entire sheet needs to be redone
  - No modern niceties, like syntax highlighting or Git integration
  - No Vim mode!

# Charles Babbage

- Mechanical computers followed from the Jacquard loom [5, Ch. 5]

## Early Text Editors

└ Punch cards

└ Analytical engine

└ Charles Babbage

- Mechanical computers followed from the Jacquard loom [5, Ch. 5]

- Following in Jacquard's footsteps, Charles Babbage and other inventors worked on what are now known as "mechanical calculators"

# Charles Babbage

- Mechanical computers followed from the Jacquard loom [5, Ch. 5]
- Babbage's Analytical Engine had several types of cards [1]:
  - Operation
    - Arithmetic
    - Combinatorial

## Early Text Editors

└ Punch cards

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- Though Babbage never finished any of his machines, his application of Jacquard's loom to performing general calculations stands as a lasting impact on computer history
- Notably, his machine introduced the concept of encoding the instructions, or operations being performed in the cards
- There were two types of operations: arithmetic and combinatorial
- Arithmetic cards specified mathematical operations to be performed, such as addition, subtraction, multiplication, etc.
- Combinatorial cards move the chains in the card reader. These are similar to branching instructions in computers we know today.
- Another notable contribution of Babbage's was the use of stacks to perform mathematics today, similar to Reverse Polish Notation

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  - Number
  - Variable
  - Index

## Early Text Editors

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  - Operation
    - Arithmetic
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  - Number
  - Variable
  - Index

- Babbage also used number and variable cards in his engine
- Number cards stored constants
- Variable cards can be used to hold intermediate results
- Index cards were used to represent locations to jump to
- You may be wondering, “What does this have to do with text editors?”
- Honestly, not a whole ton - mostly I think it's just interesting.
- However, the design and layout of the cards influenced how future punch cards were designed and layed out.

## The 1890 Census

- Hollerith took Jacquard's ideas and applied it [6]
- Basic information storage for the 1890 Census
- Standardized punch card design

## Early Text Editors

└ Punch cards

└ Hollerith cards

└ The 1890 Census

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- Herman Hollerith continued to advance the idea of using punched cards for storing programs and data
- He had participants in the census fill out a card, with holes indicating specific data points
- These cards were very simple: each hole punched in the card represented an answer to a specific question on the census
- These cards also had a notched corner, which was used to orient the cards before they were processed
- Hollerith's company eventually came to define the standard punched card used, at 80 columns with a notched corner
- These 80 hole cards eventually influenced terminal text-editors - most early text editors had a limit of 80 columns, and it is still considered good practice to keep lines below 80 columns



## Early Text Editors

Punch cards

Hollerith cards

Key Punch

### Key Punch

- The 1890 Census punch cards had several problems
- To improve on these issues, specific punches were produced

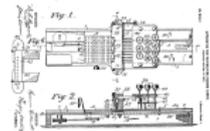


Figure 4: Patent for Hollerith Key Punch [2]

- There were several problems with the 1890 cards used:
  - The cards used in the 1890s Census were punched using train conductor's ticket punches
  - These punches were not very accurate, and limited the size of the cards that could be used
- To alleviate these problems, Hollerith created a key punch, which helped operators to enter data more accurately and quickly

## Storing Information

- Cards moved from storing simple yes/no data to storing encoded information [12]



Figure 5: A programmer operating a card punch [2]

## Early Text Editors

└─ Electrical computers

└─ Puch cards

└─ Storing Information

### Storing Information

- Cards moved from storing simple yes/no data to storing encoded information [12]



Figure 5: A programmer operating a card punch [2]

- At this point, the hole punches in cards still only stored information in a binary state, either punched or unpunched, to be counted by other machinery
- Eventually, Hollerith code was developed to encode characters to store more abstract information, like records
- Characters were encoded here by considering a hole a 0 if not punched or a 1 if it was punched
- A specialized keyboard, like the one shown here, were used to input the encoded characters properly
- These finally introduce the keyboard, but are still a long way off from what we're used to

## Line editors

- Finally programming on computers!
- Still no monitors



Figure 6: Example of a teleprinter [11]

## Early Text Editors

└─ Electrical computers

└─ Teletypewriters

└─ Line editors

### Line editors

- Finally programming on computers!
- Still no monitors



Figure 6: Example of a teletypewriter [11]

- With advances in electronics and computing, programmers could start writing code on actual computers
- But there's a small problem: monitors for computers are extremely expensive at this point and time
- Most computers of the time, instead of using monitors, printed out the output of their commands (this is why terminal interfaces on Linux are called `tty1` - teletypewriters)
- So how do you have a text editor without a terminal?
- With a fancy text processing language, a good memory, and lots of paper/ink!
- Text editors for teletypewriters are called line editors, and were the first interactive editors

# The Mighty Ed

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- Ed is infamous for its “intuitive” “interface” [3]

## Early Text Editors

└─ Electrical computers

└─ Teletypewriters

└─ The Mighty Ed

- Ed is well known for how hard it is to use
- There's even a well-known cospasta from the early '90s satirically praising it [3]
- While very hard to use and extremely unintuitive for modern-day programmers, ed marked a major development in text-editor history
- You may be wondering, "What is a line editor anyway?"
- Put simply, a line editor operates on lines by default
- Well, duh! Basically, ed has several commands that operate on specific lines

# The Mighty Ed

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- Ed is infamous for its “intuitive” “interface” [3]
- Ed uses single letter commands and sed-like syntax to work on files

## Early Text Editors

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└─ The Mighty Ed

- Ed is infamous for its "intuitive" "interface" [3]
- Ed uses single letter commands and sed-like syntax to work on files

- Load a file with cursor: `ed -p "> " file.txt`
- Print current selected line: `.`
- Append to buffer: `a`
- Finish action: `C-d control + d`
- Change current line of buffer: `c`
- Text substitution: `s/patt/rep1/n`
- Eventually, with the introduction of monitors, text editors became more and more ubiquitous

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