

Retrochallenge 2021 -- Paleoferrosaurus

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Talk is cheap – unless you're paying Ma Bell.

Back in the dark ages – before unlimited wireless plans and smartphones -- calling anybody who was out-of-town was EXPENSIVE. Keeping in touch with family members, girlfriends, bulletin-board systems, and the nascent internet all served to run your phone bill into the triple digits. It was painful if you were trying to pay your phone bill at entry-level wages. If you were still living with your parents, it was even worse.

Toll Fraud, sometimes calling PHREAKING, was motivated by these costs. To be fair, we're not necessarily talking about transoceanic or transcontinental phone calls. Especially in small towns, a quick call to my high school girlfriend – a mere 12 miles away, could cost a few dollars. Dialing into the local university mainframe to submit a programming assignment might cost \$20 with transmission speeds of 300 baud or less. At the time, I lived in Albion Pennsylvania and had local telephone service provided by the Enon Valley Telephone Company. The nearest large city, Erie, was served by GTE. Eight miles to the West was the great state of Ohio. Forty-five miles to the East was New York. Trust me when I say that EVERYTHING was long distance.

Like many others, my first “online” experience was courtesy of the local college. Our high school used Teletype Model 33 ASR terminals with punched tape. One was designated for online use, the other was the “offline” machine used to punch tapes in advance for batch processing. You wrote your programs on paper in longhand and checked them carefully. Once you were sure the program was as good as you could make it, you submitted it to the teacher for approval. If he approved it, you could then sign up for time on the offline machine to punch a tape. The program listing was then desk-checked again and submitted to the teacher for a second time. When given approval (assuming you had nearly perfect typing skills), you could then schedule an online session to actually RUN the program.

Take a seat at the terminal. Unwrap your tape (experienced users typically used an overhand figure-8 wrap.) Place the tape in the reader. Bring the machine off-hook and dial the number. Listen for the MF tones to make sure your call is going through. Assuming you didn't get a busy signal, you then heard a few rings and the modem carrier. Twist the dial from “LOCAL” to “ONLINE.” Press carriage return. Wait for the mainframe (a UNIVAC 90/60) to greet you. LOGON.

If the program was an exercise in BASIC, launch the interpreter with the \$EXEC BASIC command. The interpreter began executing and asked you “UNIVAC BASIC – NEW OR OLD?” answer with “NEW” and press return. “NEW PROGRAM NAME?” sputters from the teletype. Give it a short name – you've only got six letters and your

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sharing space with all the other users on this account. MCCA01 will be this program's name; MCCA is short for MCCABE and this is program 01.

Finally, you get the BASIC prompt. Take a deep breath. Verify that your program tape is on the reader and the nasty little plastic tab is still latched. Move the lever on the reader to START. Listen for the machine-gun rattle of the tape reading into the teletype. Keep an eye on the printout as the characters are echoed back to the terminal. Make sure the tape is feeding freely. Lookout for any snags or tangles.

With any luck, the program reads properly and now resides in the core memory of the remote mainframe. You're tempted to LIST the program, but you don't have time – you've only got a ten-minute time slot with a possible extension of five minutes before the next user gets the terminal. Type "SAVE" to store the program on disk. This will save the time required for reading it in from paper tape again. RUN.

Darn it! There's an error in line 220!

```
LIST 220
```

```
220 LET C=SQR(A*2+B*2.
```

Forgot to close the parentheses... Retype the line.

```
220 LET C=SQR(A*2+B*2)
```

```
RUN
```

This time, the program executes but gives the wrong answers. What the heck??? Oh! I multiplied A and B times two rather than squaring them! Back to line 220!

```
220 LET C=SQR(A**2+B**2)
```

```
SAVE
```

```
RUN
```

This time, the program prints the correct answers!

Advance the paper on the teletype and tear off the messy copy with all the login dialogue, program entry record, and debugging nonsense.

```
LIST
```

Now RUN the program. This time it's for credit in the programming class.

```
BYE
```

```
LOGOFF
```

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This little session took a little more than 12 minutes online. The long-distance charges came to around \$1.25. You used around four CPU seconds for debugging and execution of your program. That only comes to \$0.24. They bill for I/O as well, but those charges pale in comparison. Total cost for a student program to solve Pythagoras' Famous theorem: around \$2.00. Multiply that by the 20 students in CS-101, and this simple little programming exercise cost the school \$40.

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