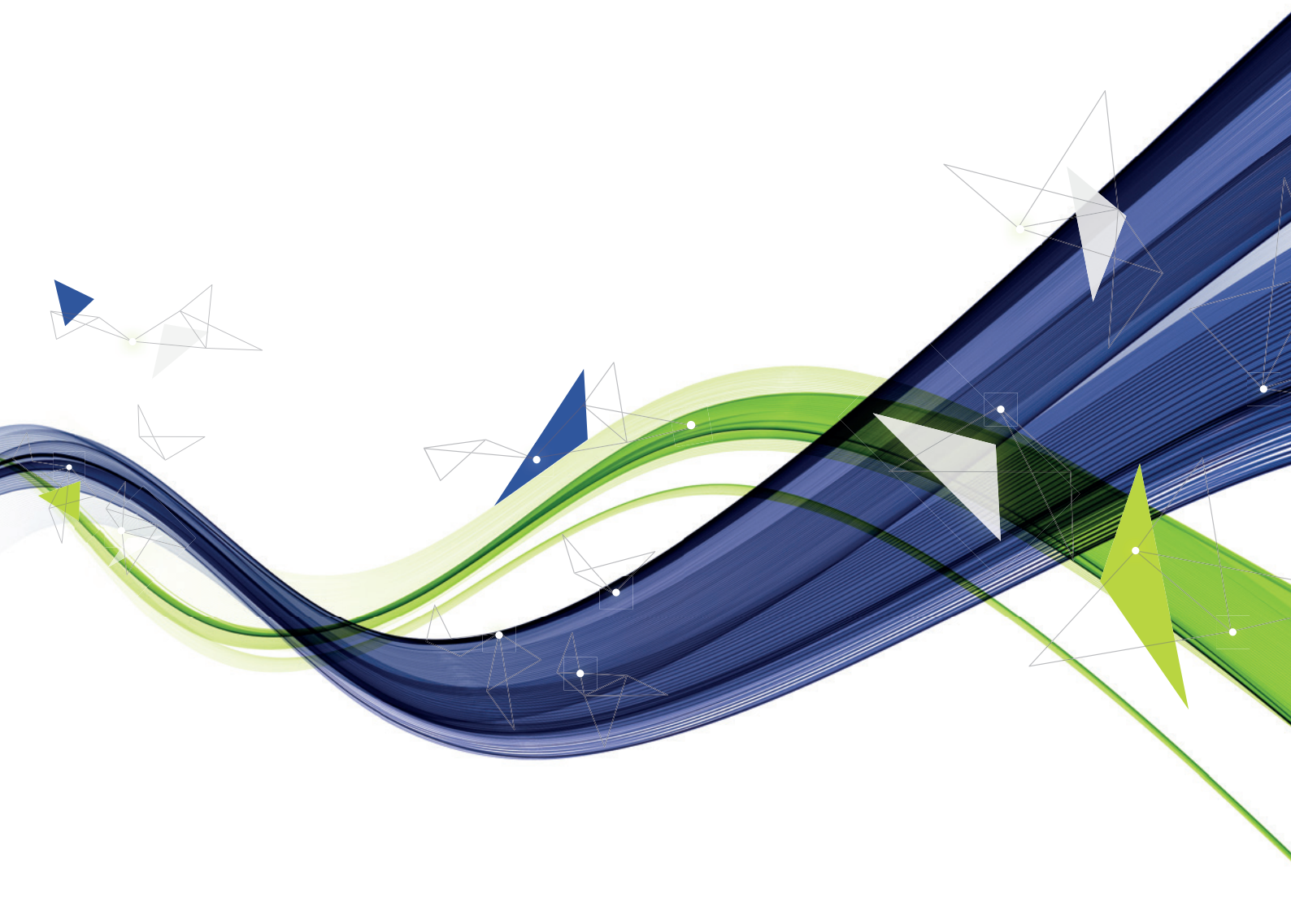
CONGRATS

You've made it to our coding challenge




ONE STEP CLOSER
TO BECOMING A
PARADOX CAT

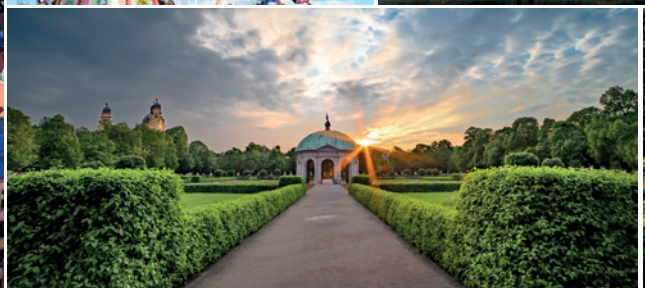
WHAT YOU CAN EXPECT

We make sure you feel at home at work. Our employees enjoy a ton of benefits that help them grow professionally as well as personally. We offer good, fair salaries, whether for starters or experienced professionals. We maintain flexible working hours and give you time to refresh – 30 days of vacation days a year (plus state and national holidays, which are not included).

We offer training, encourage a collegial working atmosphere, with lots of team events, and make sure you're comfortable in the workplace, with adjustable tables, free drinks and coffee, among others.

If you're applying from abroad, we know that relocating to another country is a big deal. There are so many things to take care of, most important of which is the working visa. But dozens of little tasks also need to be done, such as arranging a moving company, opening up a new bank account, and getting an apartment, just to name a few. Our professional relocation partners will support you with these things, so you don't have to worry.




OUR BENEFITS

Relocation Support

- We take care of your visa and work with professional relocation partners to make sure that you will get settled in your new home

Work Content

- Exciting projects within the scope of HMI development
- Agile project consulting and support

Development Possibility

- Personal and professional development
- Training budget for external courses

Health

- Sponsored Jobticket or Jobbike for a comfortable way to work
- Cooperation with different fitness centers to train with special conditions

Office

- Modern workplace with bright and friendly office
- Young dynamic team, collegial atmosphere

Flexibility

- Self-managed working with personal responsibility
- Flexible working hours & Home-Office
- 30 days of vacation a year (in addition to the state and national holidays)

Snacks & Drinks

- Fresh fruits, snacks & drinks and coffee at your disposal

Team Events

- Lots of team events, like christmas & summer party or wine tasting

PROGRAMMING CHALLENGE

We strongly believe that programming is fun, and we hope that you will find this assignment entertaining as well! For a little bit of a challenge, there is nothing better than doing some real retro-programming! Use a programming language you feel comfortable with and which is relevant for the job. This exercise will allow us to discuss how you approach an unknown problem.

What tool besides your IDE do you think would be useful to solve this type of problem?

A hint for you: Time-box yourself – this is a hard assignment and you don't need to actually finish to demonstrate your effort.

DECODING EXERCISE

„Would you hire a magician without asking them to show you some magic tricks? Of course not."

- The Joel Test: 12 Steps to Better Code

Approach

- Make sure that you find a system function or library to read the data file for you
- Don't dive too deep into the AFSK explanations on the web – the encoding is actually pretty simple
- Feel free to introduce other helpful library functions to make your job easier. Though it's not really necessary, it helps keep the code on a higher level

Instructions

- Decode the binary data encoded in the audio file in WAV format (contained in the ZIP archive together with these instructions)
- The data is encoded using Audio Frequency Shift-Keying (AFSK) in its simplest form
    - A single bit is the waveform between two zero-crossings
    - A one signal is a rectangle signal of t = 320 microseconds
    - A zero signal is a rectangle signal of t = 640 microseconds
    - The real-life data might no longer be an ideal rectangle, since it's been stored on physical media (e.g. a tape drive)
- The bit-stream that can be extracted from the decoded audio signal can be converted into bytes
    - The signal starts with a lead tone of roughly 2.5 seconds (all 1-bits, or 0xff bytes), and ends with an end block of about 0.5 seconds (all 1-bits).
    - 11 bits are used to encode a single byte – 8 bits for the byte plus one start bit (valued 0) and two stop bits (valued 1).
    - The data is encoded with least-significant bit first.
- The byte-stream has the following form:
    - The first two bytes are 0x42 and 0x03
    - After that, the data is structured in 64 messages of 30 bytes each, with the 31st byte being the checksum of the 30 bytes before that (in total 1984 bytes = 64 * 31 bytes). The last byte before the end block is a 0x00 byte.
- The checksums will help you detect whether or not your decoding works
- The data in this real-life file will have no meaning to you, unless you can figure out the machine that created it, and this is nearly impossible (so don't try).

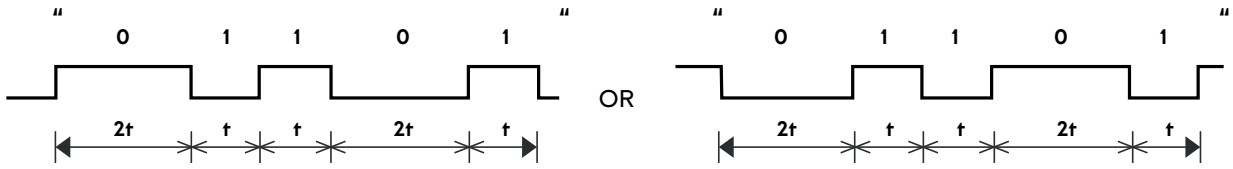
FURTHER EXPLANATIONS

Binary encoding

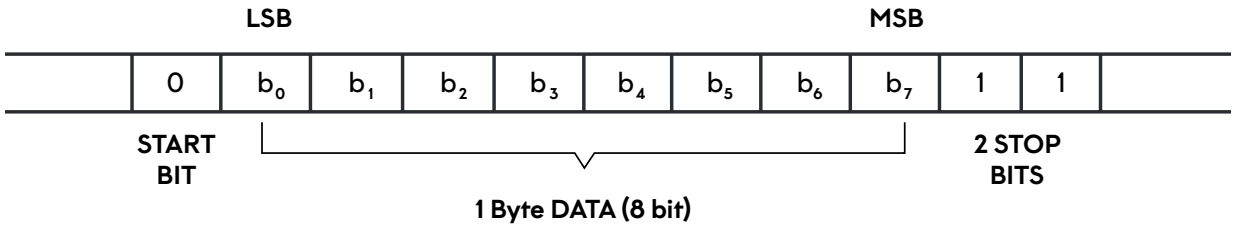
1. Modulation system

"1" ..... t = 320 µs
"0" ..... 2t = 640 µs

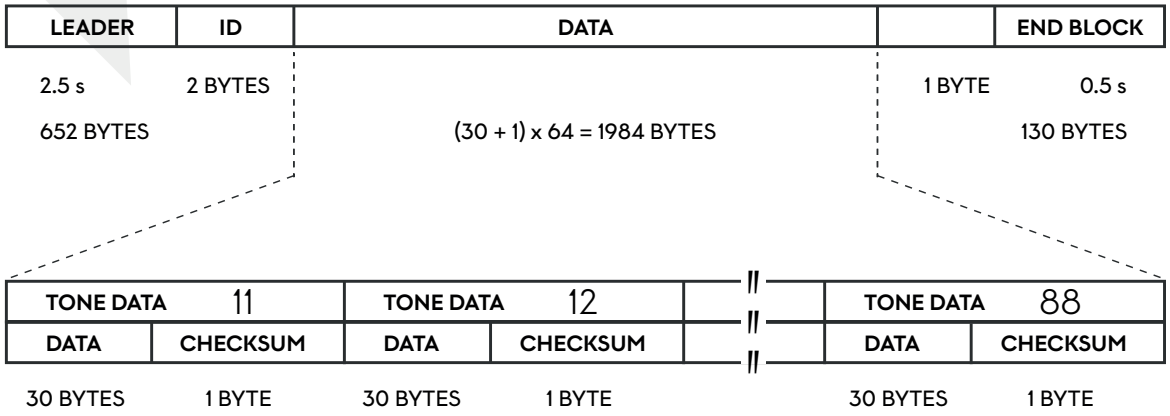
Example



Bit-stream encoding, a single byte in the bit-stream



Message format, overall structure and checksum positions in byte-stream



Questions?

In case you're facing unexpected issues or not sure how to proceed properly, please contact us and we will provide you with more information.

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