



HORIZON

QUANTUM COMPUTING

OPPORTUNITIES AT THE INTERSECTION OF QUANTUM
COMPUTATION AND QUANTUM COMMUNICATION

Horizon's mission is to make quantum
computing useful to industry

useful *adj.*

capable of or suitable for being used for a particular purpose

synonyms:

1. **exploitable**

2. **available**

MACHINE LEARNING EXAMPLE

1,000 points → 1,000,000 points

CLASSICAL
(naive)

1,000,000,000x slower*

CLASSICAL
(highly optimized)

2,000x slower*

QUANTUM
(HHL-based)

4x slower*

*approximate, based on GP regression with fixed number of hyper-parameters

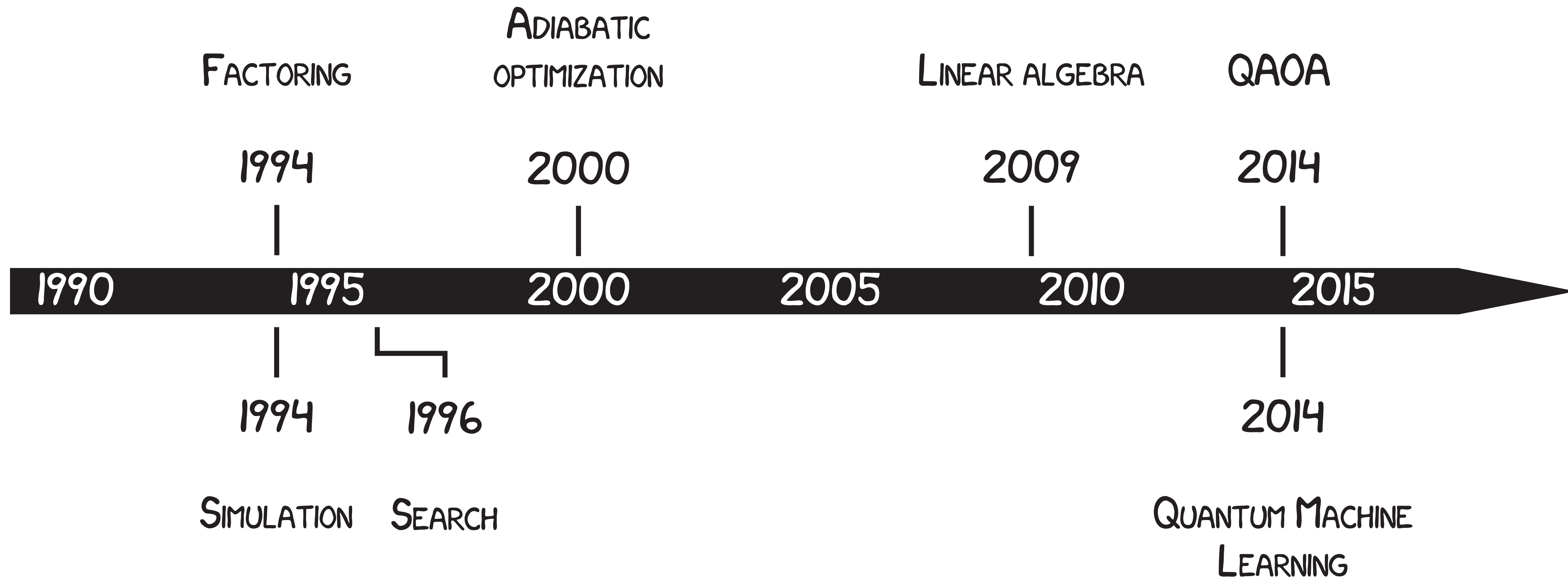
useful *adj.*

capable of or suitable for being used for a particular purpose

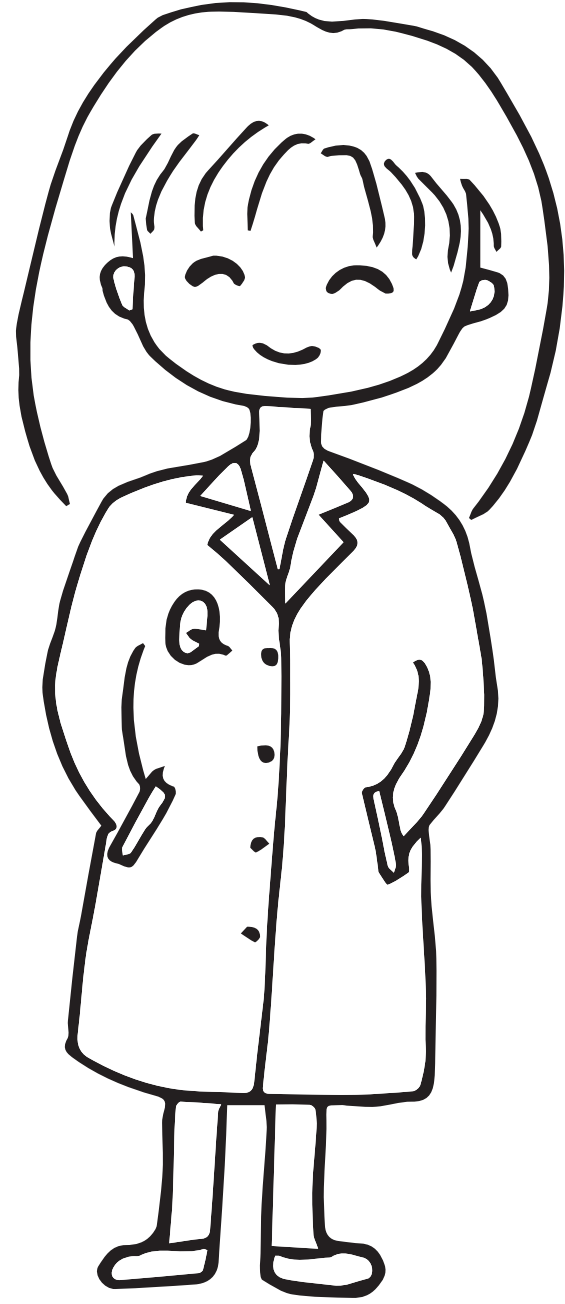
synonyms:

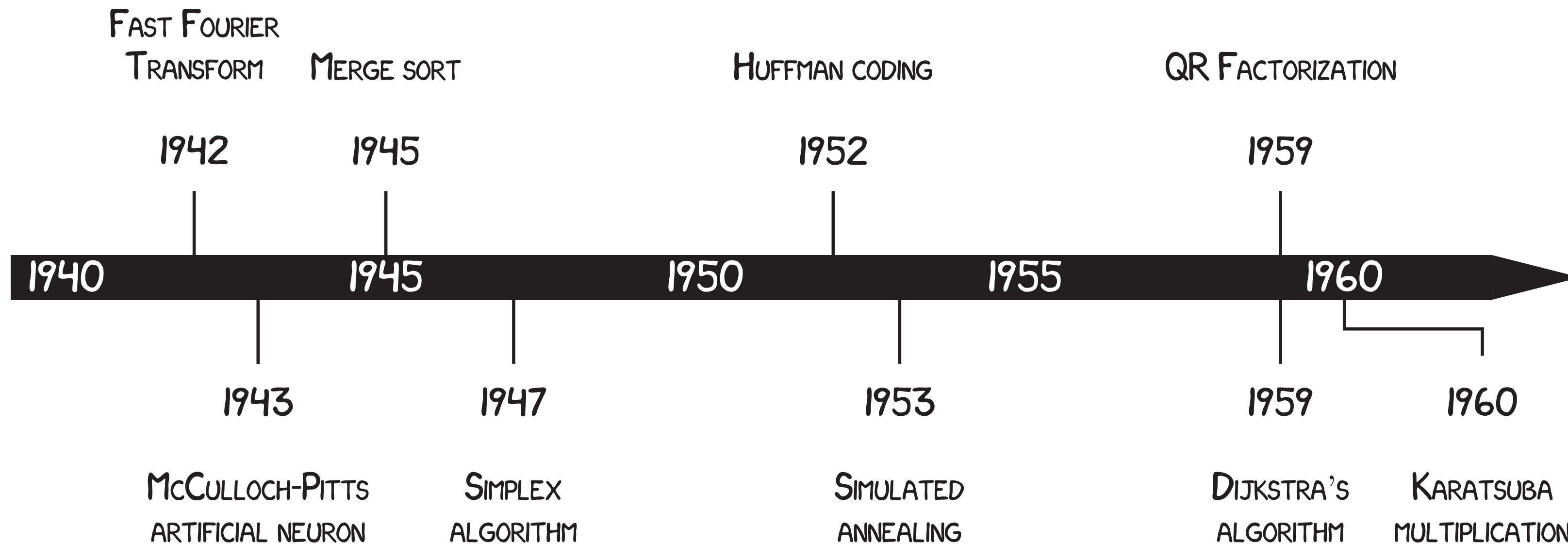
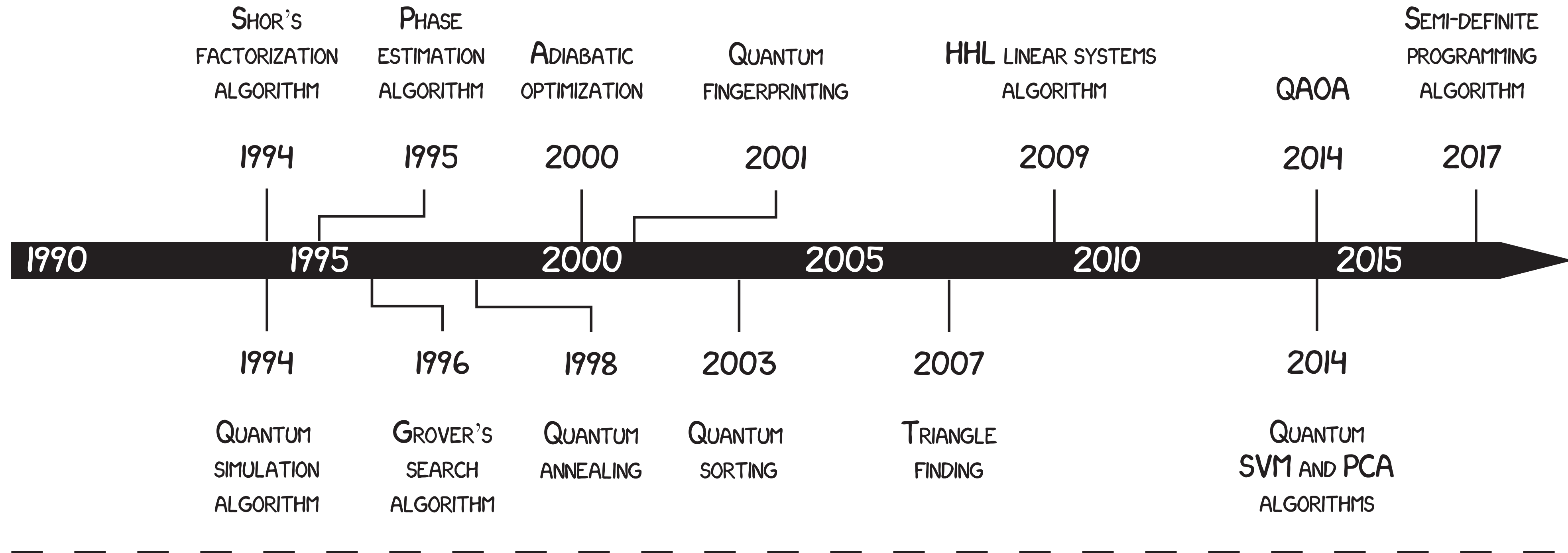
1. **exploitable**

2. available

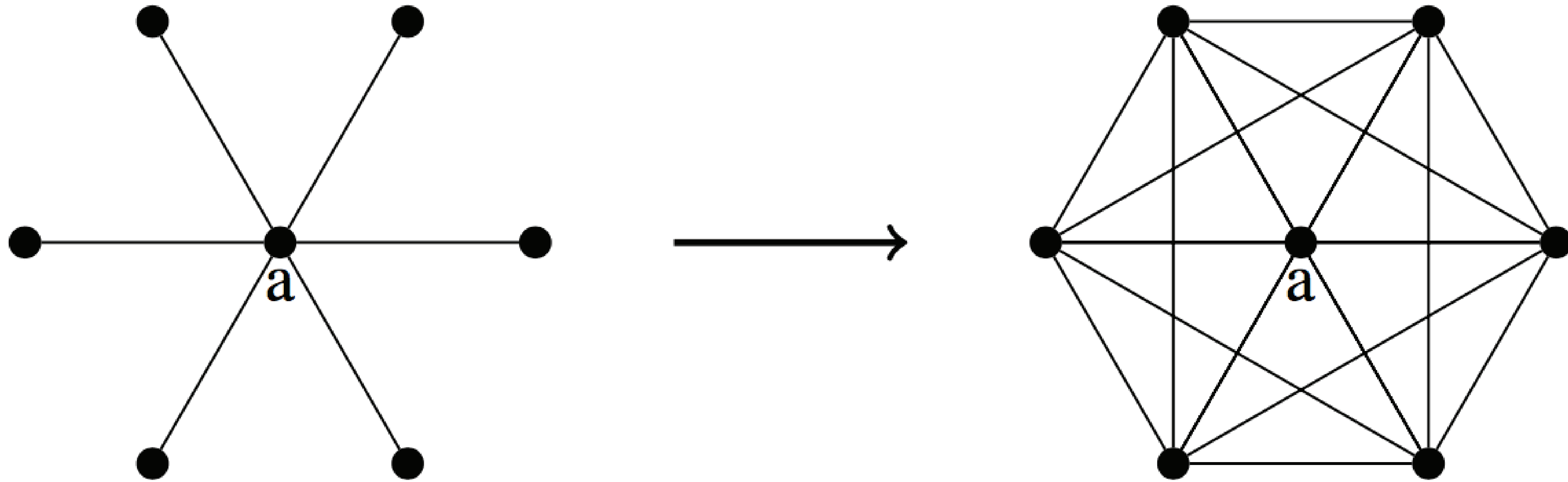




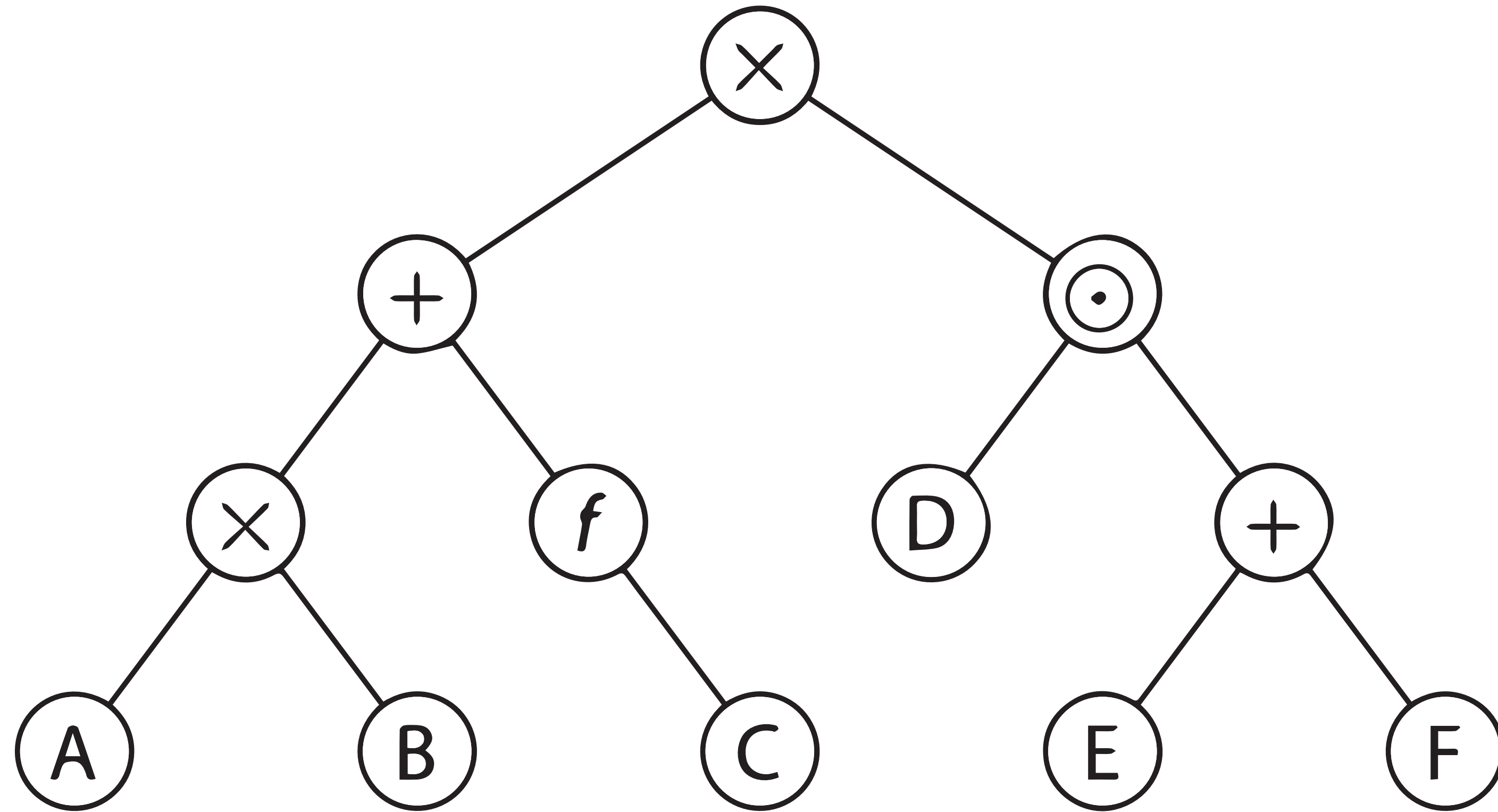




DATA STRUCTURES



ABSTRACTION



useful *adj.*

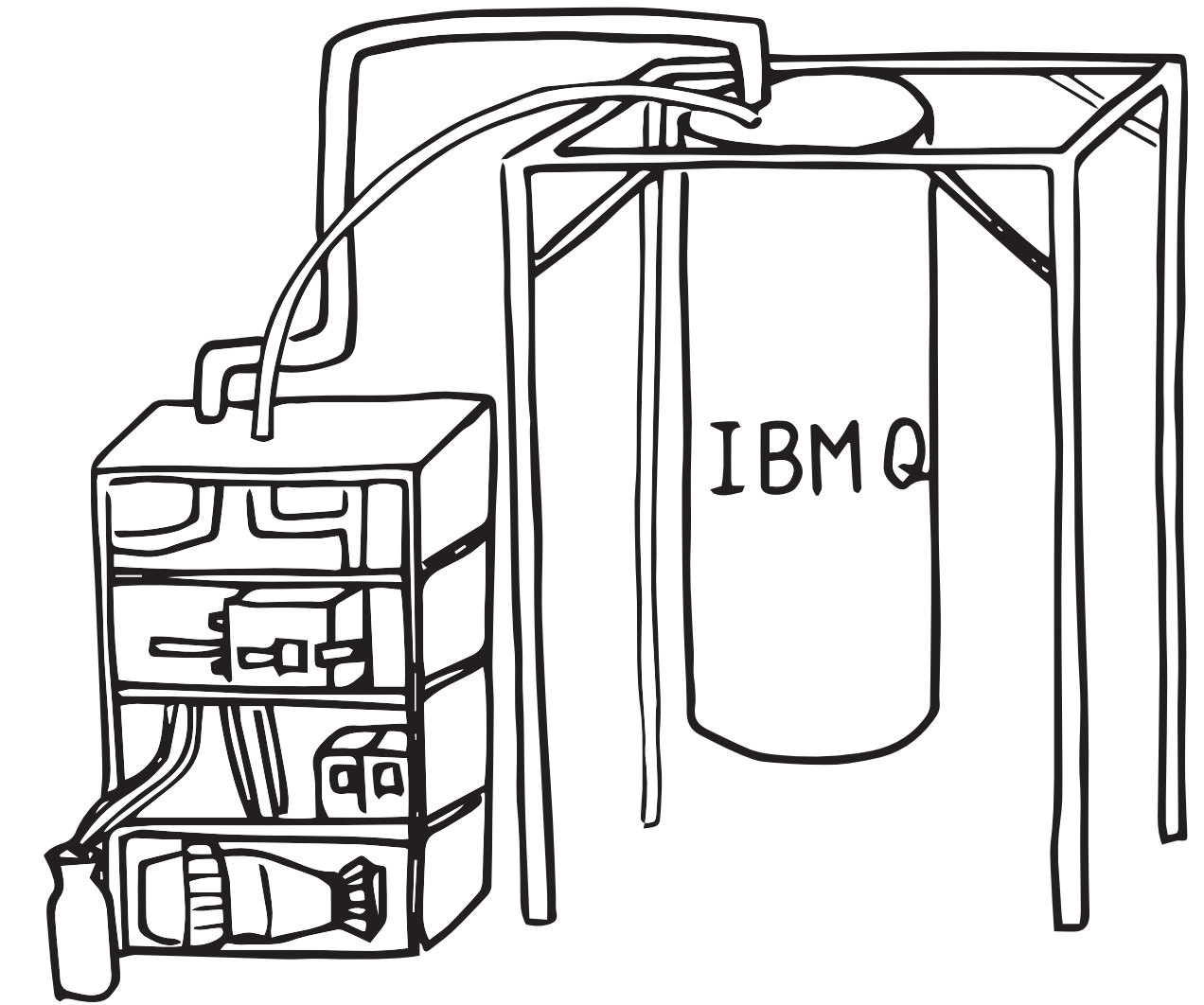
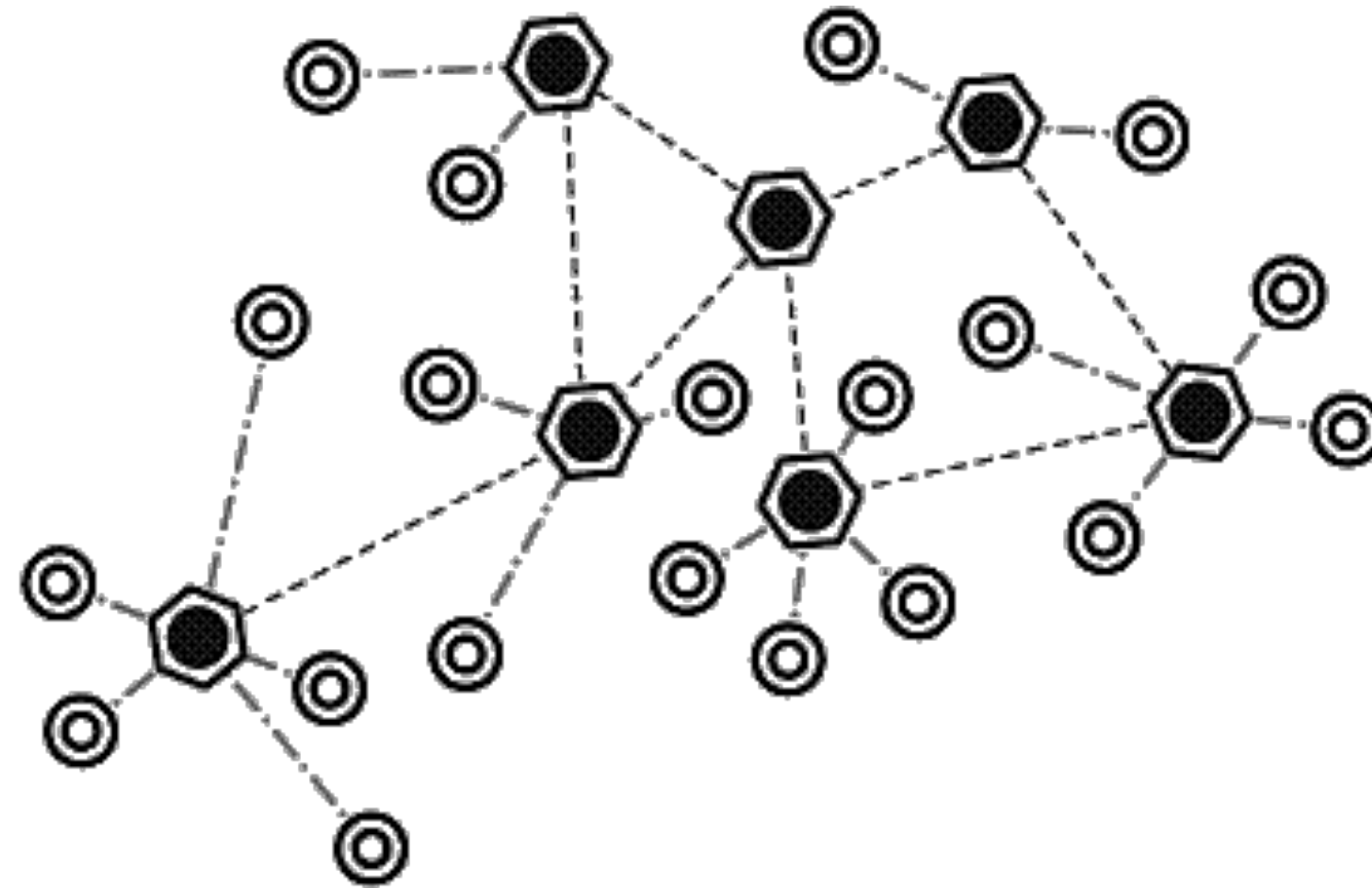
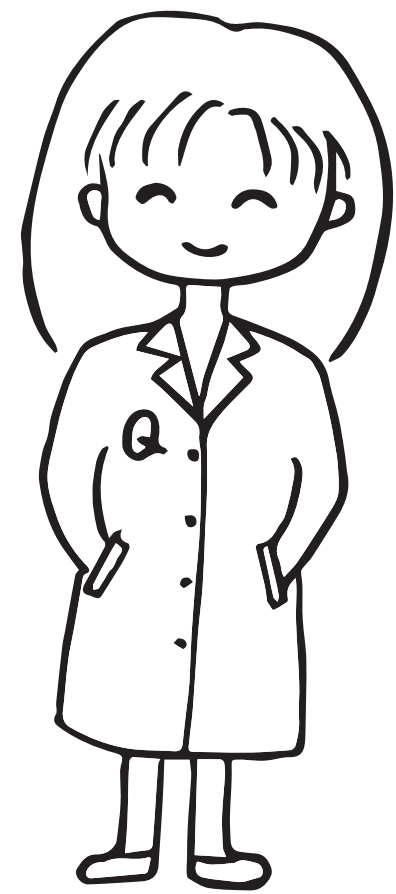
capable of or suitable for being used for a particular purpose

synonyms:

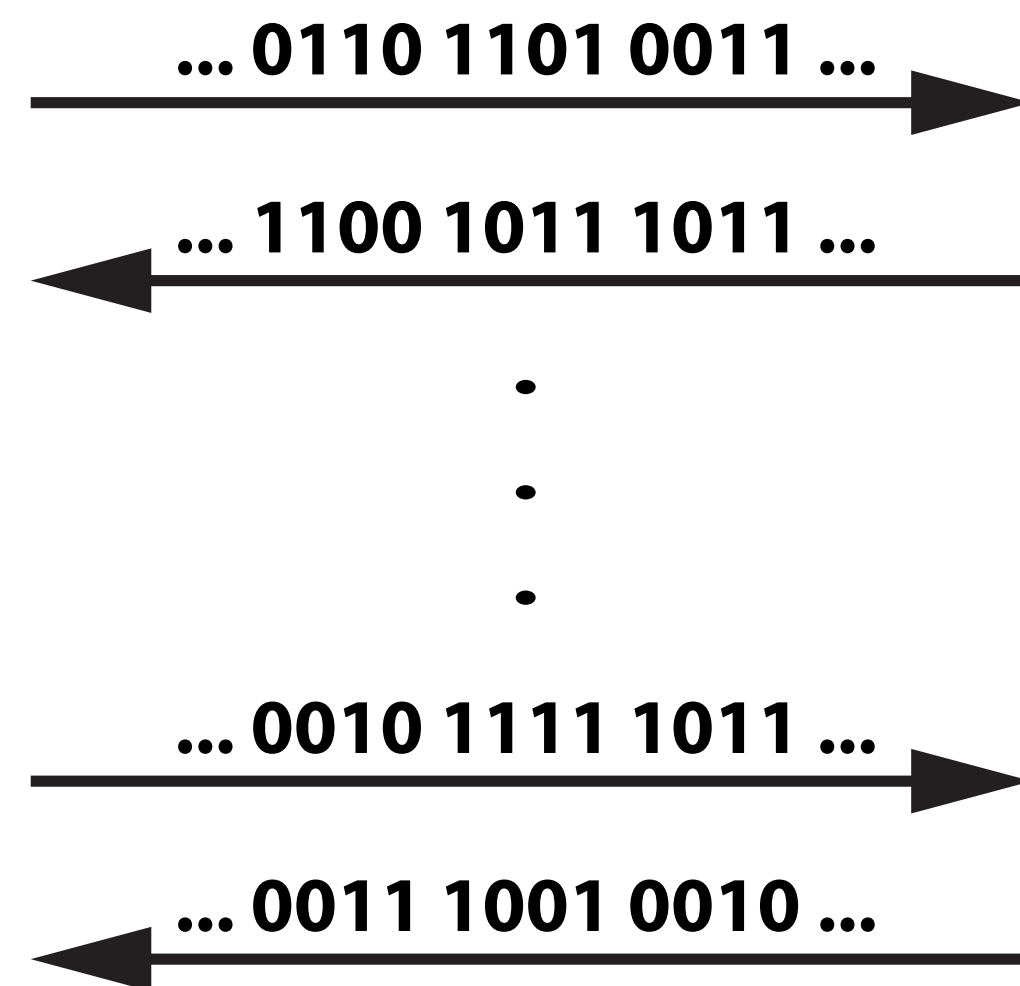
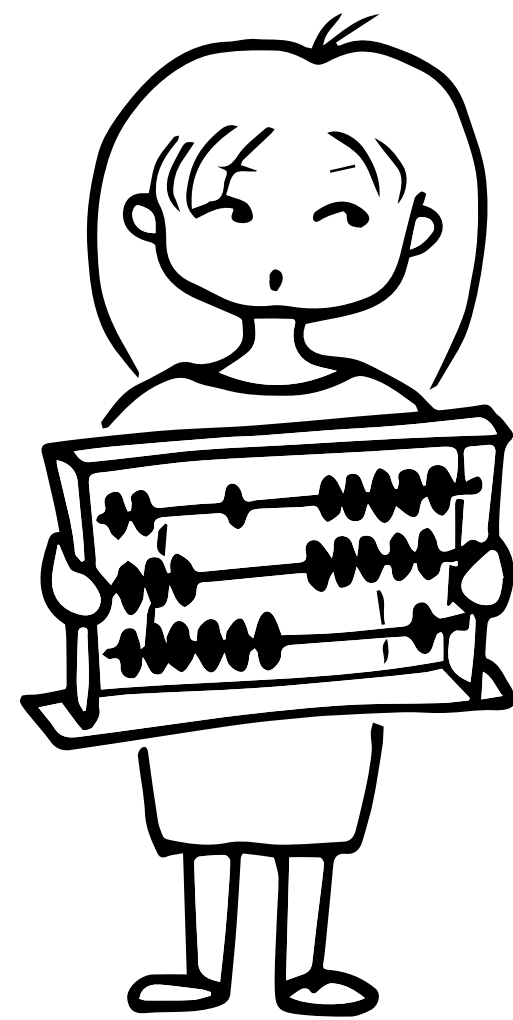
1. exploitable

2. available

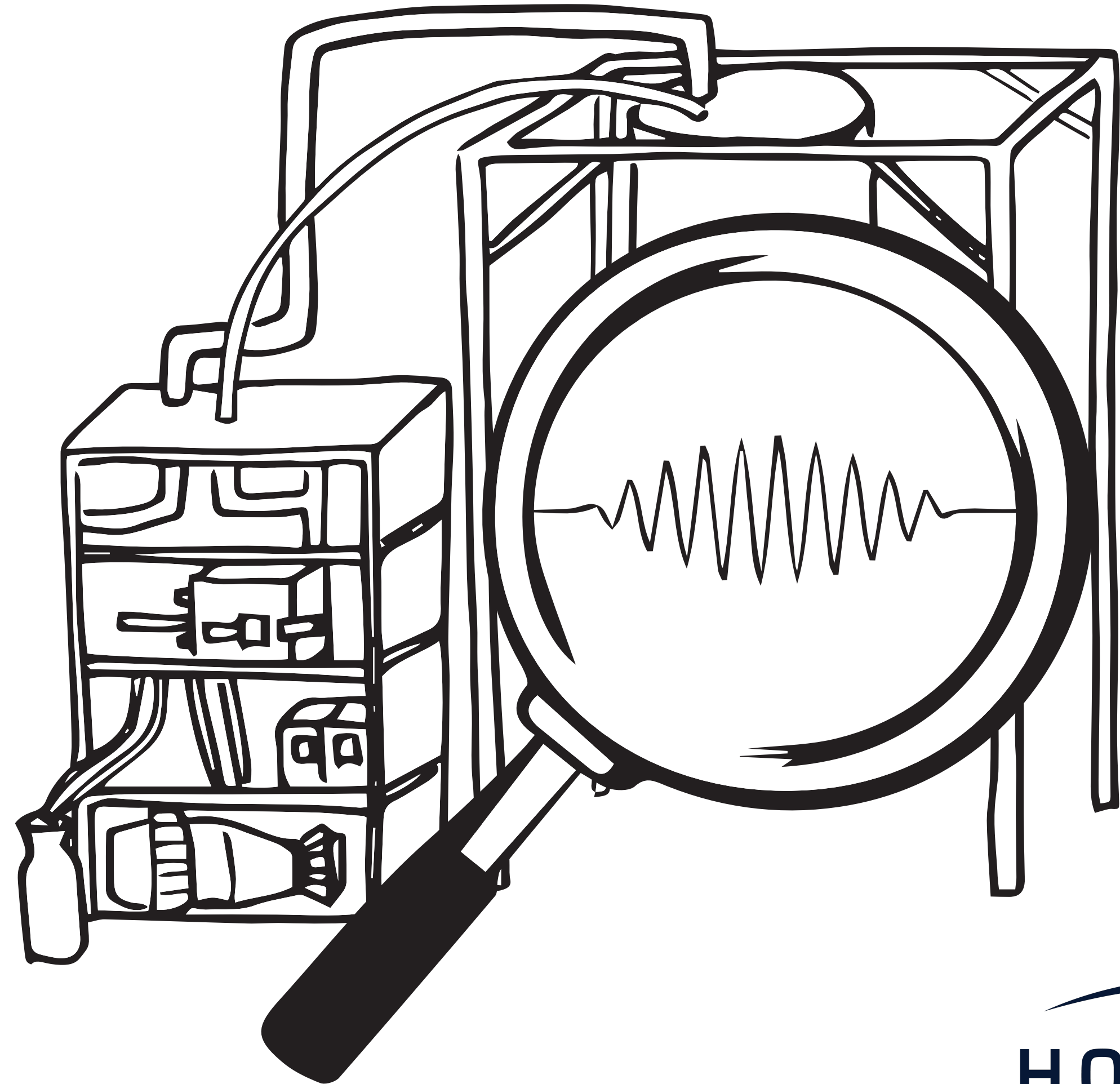
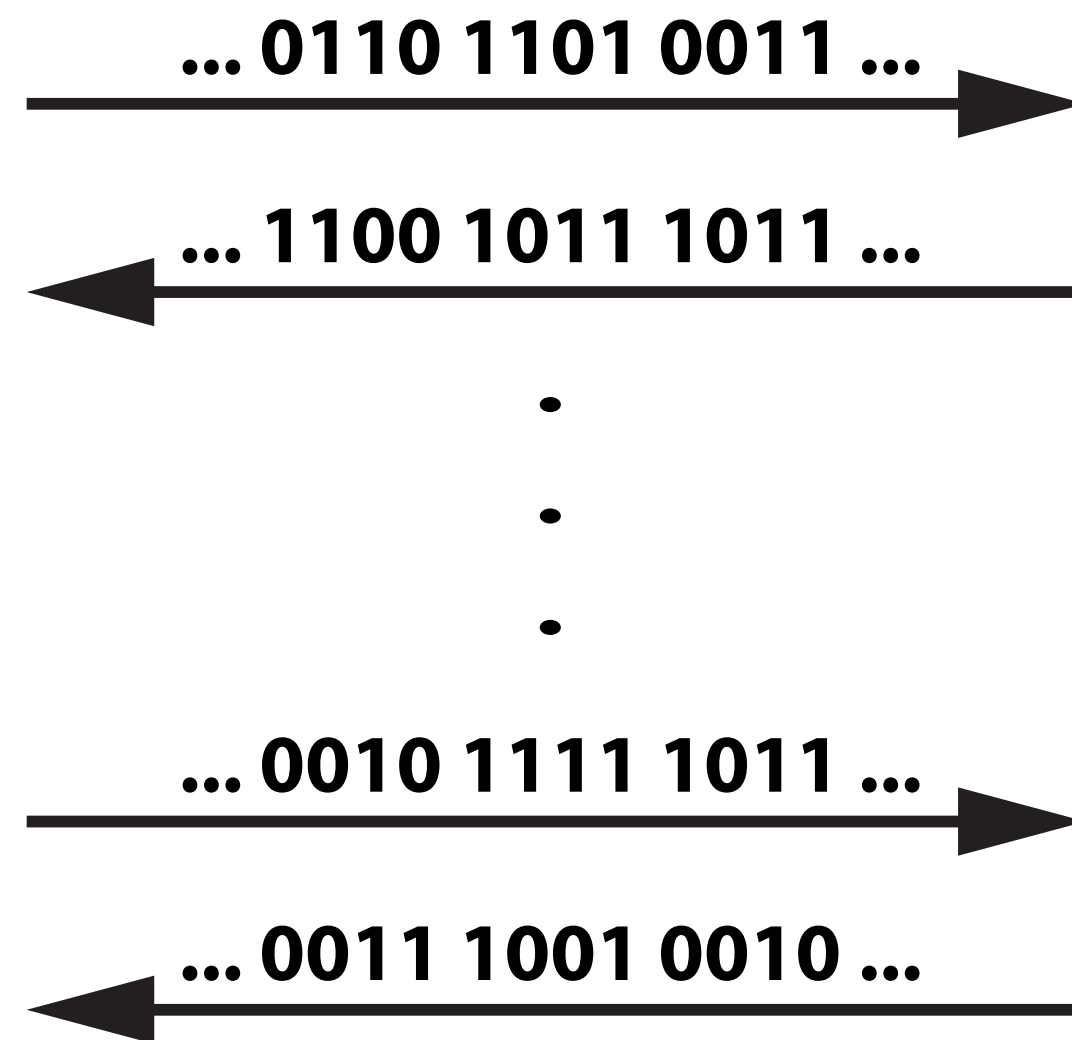
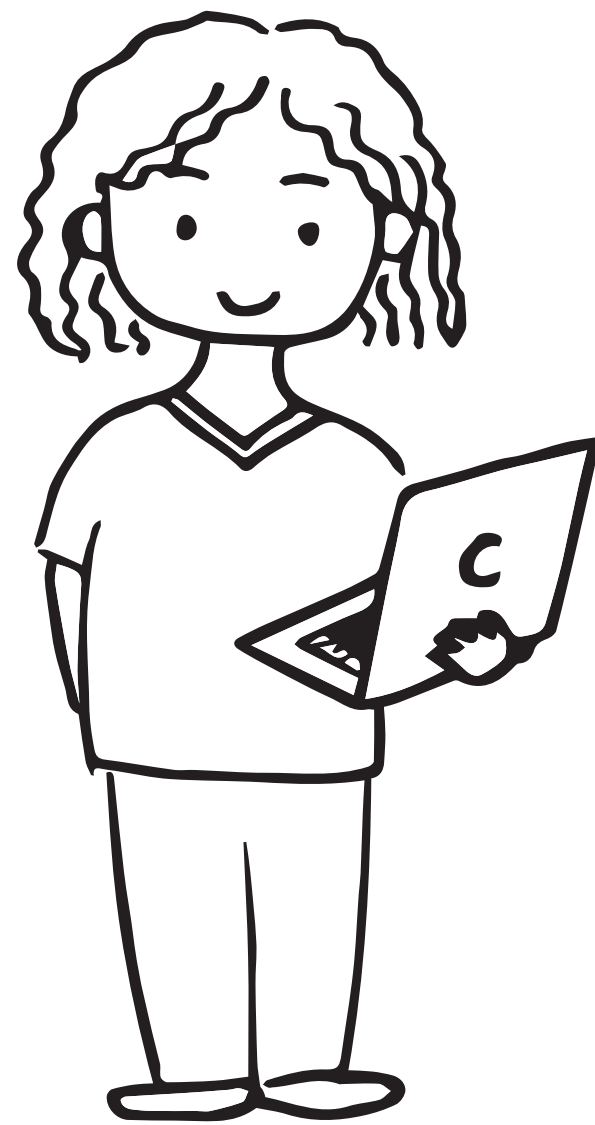
QUANTUM CLOUDS



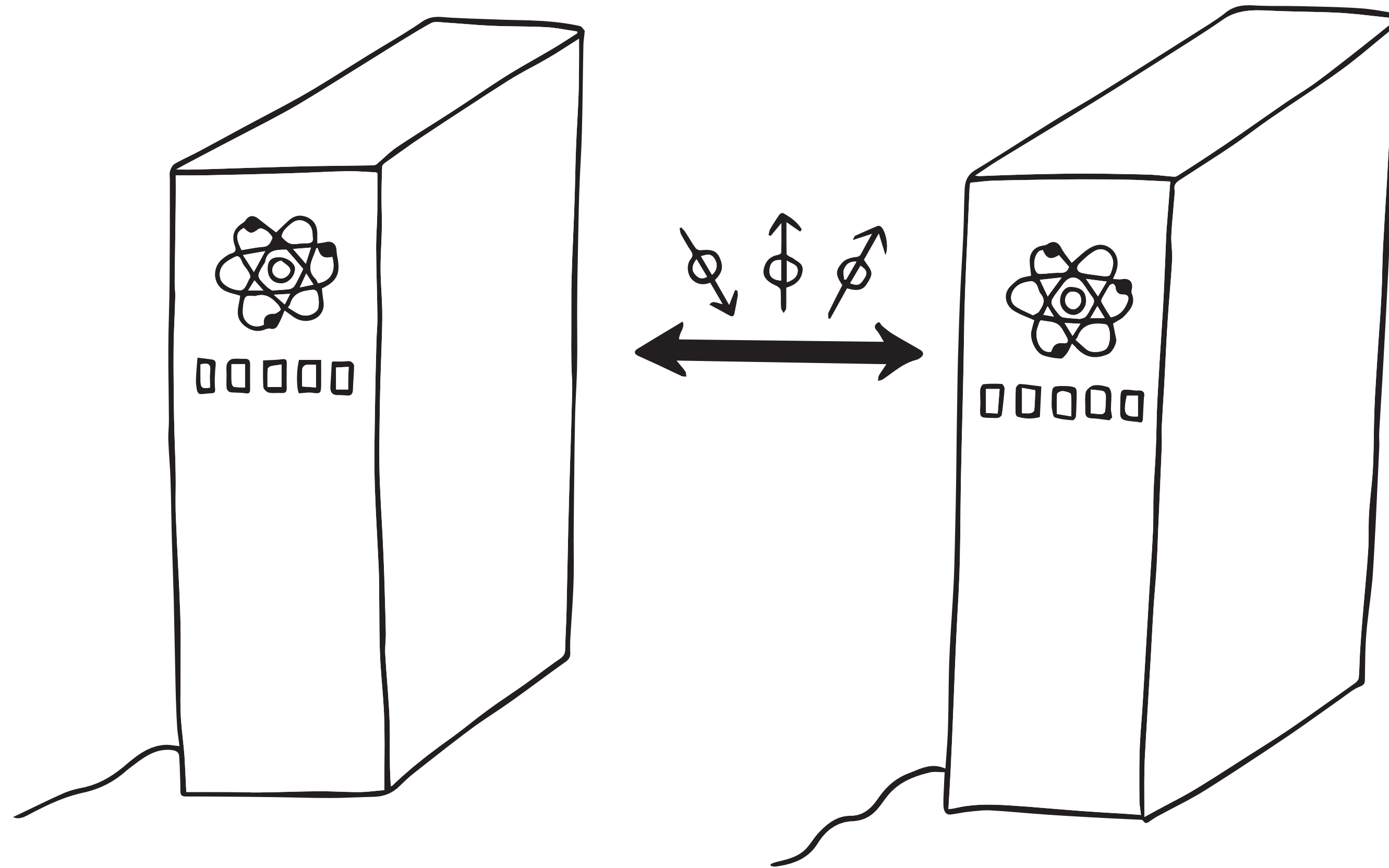
SECURE DELEGATION



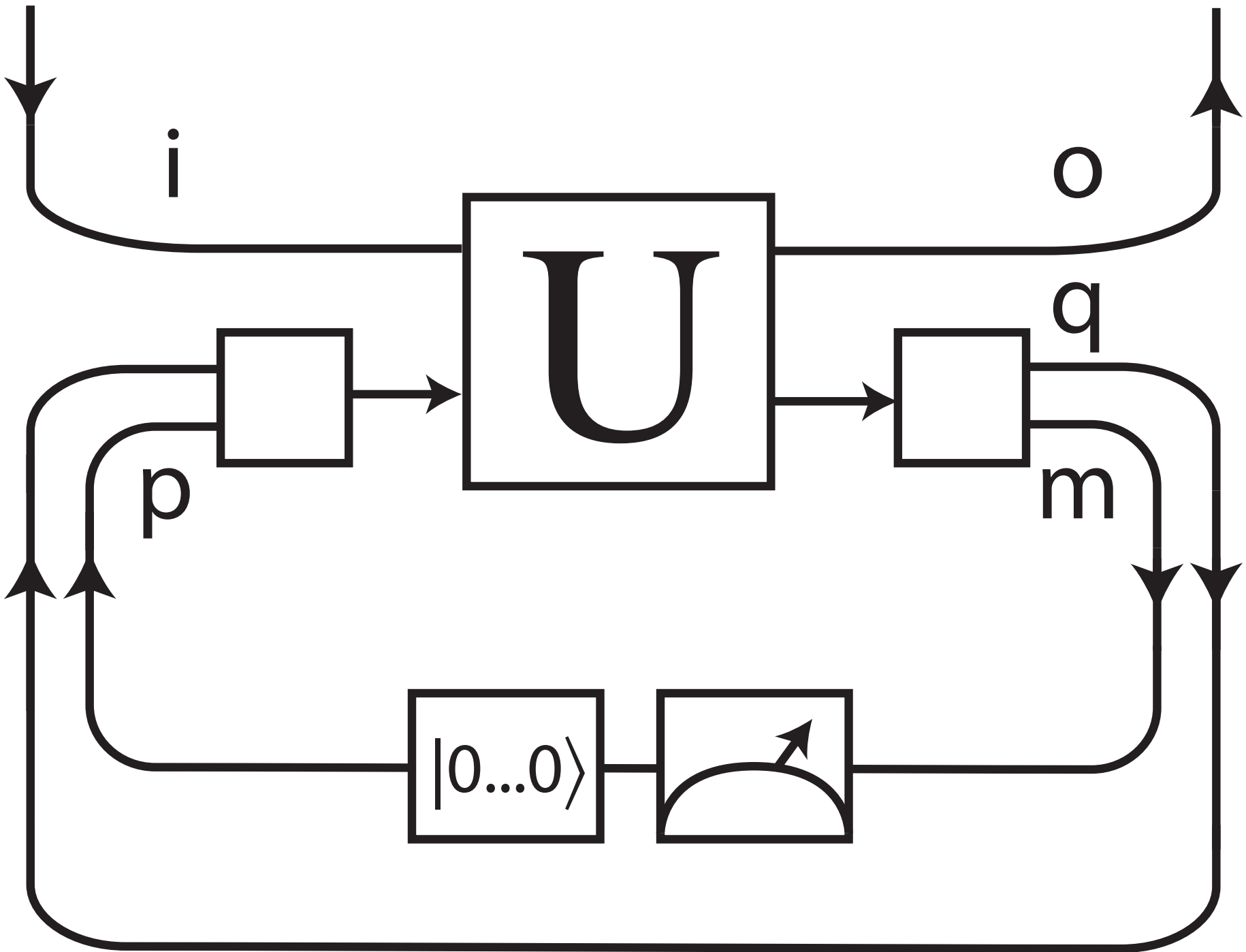
VERIFIED COMPUTATION



NETWORKED COMPUTATION



GENERAL PURPOSE QUANTUM COMMUNICATION



i : input space
 o : output space
 q : memory
 p : preparation space
 m : measurement space

$$\text{Device} = \{I, O, Q, P, M\}$$



HORIZON
QUANTUM COMPUTING

NEED FOR STANDARDS

- Support for heterogeneous networks
- Routing and transmission control for quantum messages
- Interoperability between different device technologies

A misty mountain landscape with a quote overlaid. The mountains are silhouetted against a hazy, light-colored sky. The quote is in white text, and the word 'quantum' is written in red above it with a red arrow pointing to the word 'five' in the quote.

“I think there is a world market for maybe five computers.”

quantum



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