

Y. Gurevich, “A New Thesis”, Abstracts, American Mathematical Society, August 1985, page 317, abstract 85T-68-203.

Turing’s thesis is that every computable function can be computed by an appropriate Turing machine. The informal proof of the thesis gives more: every computing device can be simulated by an appropriate Turing machine. The following much stronger form of the thesis seems to be very much accepted today: every sequential computing device can be simulated by an appropriate Turing machine in polynomial time. Turing machines are computational devices with unbounded resources. First, we adapt Turing’s thesis to the case when only devices with bounded resources are considered. Second, we define a more general kind of abstract computational device, called dynamic structures, and put forward the following new thesis:

Every computational device can be simulated by an appropriate dynamic structure – of appropriately the same size – in real time; a uniform family of computational devices can be uniformly simulated by an appropriate family of dynamic structures in real time.

In particular, every sequential computational device can be simulated by an appropriate sequential dynamic structure.

A contribution of Andreas Blass is acknowledged. Descriptions of computational devices are solicited for further confirmation of the thesis.

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