

Abstract State Machine

Notation : ASM

Description : By taking advantage of the opportunities provided by carefully selected categorical terms, infinitely many automatic actions can be grouped under a handful of small, easily comprehensible, abstract concepts. This gives human understanding the ability to make sense out of the otherwise incomprehensible mass of concrete happenings going on inside a machine.

No matter how many times a computer processor clicks per second, without abstraction, they are nothing more than clicks in the void. Human understanding has to repeatedly put those clicks to use, in ever increasing cycles of machine action, creating higher and more precise refinement of conceptual data each time. Pushes and pops have to fire in the right order to be of any use at all to human conceptual faculty. Eventually we can construct the virtual reality that we need to suit a given purpose.

When these abstract categories are refined and organized they become shorthand for a much broader array of phenomena than would first meet the eye. The Ethereum Virtual Machine is an abstract state machine because it can be in any one of a given number of conditions depending on its inputs and its current state.

Abstract state machines support the practitioner in exploiting their power of *abstraction in terms of an operational system view* which faithfully reflects the natural intuition of system behavior. Even the knowledge-base of experts has an operational character and guarded command form: “in *this* situation, do *that*”. A solid model of automata which are amenable to mathematical and experimental analysis. This is further enhanced by the ability to link requirements capture to detailed design and coding. Finally, it provides on-the-fly documentation which can be used for inspection, reuse, and maintenance.¹

By combining abstraction and stepwise refinement and putting them on a semantical, rather than a syntactical basis, and combining them with the operational nature of machines, a pseudocode can be made modularized, refined, and granular, in a logically relates the sensible parts for the viewer. What this means is assigning operands and operators to specific, discrete functions, without conflating either the nature of their being, or of their operation. When the parts of multiple functions are unified behind

1. E. Borger and Stark Robert F. 2003. *Abstract state machines: a method for high-level system design and analysis*. Springer.

a single set of defined concepts, the possibility for confusion is massively reduced, because the differences and similarities between each function present themselves to the user rather than having to be painstakingly weeded out, through trial and error, by the user.