

Axon Technical Specification

Draft 1

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Abstract

This is a technical reference for the Axon decentralized communications library.

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Chapter 1

Introduction

Axon is a development platform for decentralized communications software. [Bar64]

Appendix A

Formal semantics

$t ::=$	$\text{start } t \ t \ t \mid \text{wait } t \mid \text{stop } t \mid \text{kill } t \mid \text{quit} \mid \text{die} \mid \text{yield} \mid$	concurrent
	$\text{filter } t \ t \ t \mid \text{give } t \ t \mid \text{take} \mid \text{emit } t \mid \text{recv } t \mid$	message
	$\text{commanded } t \ t \mid \text{command } t \ t \mid \text{bind } t \mid$	processing
	$\text{codec } t \ t \mid \text{encode } t \ t \mid \text{decode } t \ t \mid$	serial
	$\text{serve } t \ t \ t \mid \text{connect } t \ t$	communication
$v ::=$	$\pi \mid a$	

Concurrency

$$\Pi = \{\pi_i \mapsto (t_{start}, t_{stop}, t_{die})\}_{i < |\Pi|}$$

$$\begin{array}{c}
\frac{\text{choose } \pi \notin \text{Dom}(\Pi)}{\Pi, \pi_0 \vdash \mathbf{start} \ t_1 \ t_2 \ t_3 \rightsquigarrow [\pi \mapsto (t_1, t_2, t_3)]\Pi, \pi_0 \vdash \pi} \text{START} \\
\\
\frac{\Pi(\pi_0) = (v_1, t_2, t_3) \quad t_2 \neq \emptyset}{\Pi, \pi_0 \vdash v_1 \rightsquigarrow \Pi, \pi_0 \vdash \mathbf{quit}} \text{END} \quad \frac{\Pi(\pi_0) = (\mathbf{quit}, t_2, t_3)}{\Pi, \pi_0 \vdash \mathbf{quit} \rightsquigarrow [\pi_0 \mapsto (t_2, \emptyset, t_3)]\Pi, \pi_0 \vdash t_2} \text{QUIT} \\
\\
\frac{\Pi(\pi_0) = (v_1, \emptyset, t_3) \quad t_3 \neq \emptyset}{\Pi, \pi_0 \vdash v_1 \rightsquigarrow \Pi, \pi_0 \vdash \mathbf{die}} \text{QUITED} \quad \frac{\Pi(\pi_0) = (\mathbf{die}, \cdot, t_3)}{\Pi, \pi_0 \vdash \mathbf{die} \rightsquigarrow [\pi_0 \mapsto (t_3, \emptyset, \emptyset)]\Pi, \pi_0 \vdash t_3} \text{DIE} \\
\\
\frac{\Pi(\pi_k) = (v_{1k}, \emptyset, \emptyset) \quad \Pi(\pi_j) = (t_{1j}, \cdot, \cdot) \quad \pi_j \neq \pi_k}{\Pi, \pi_k \vdash v_{1k} \rightsquigarrow \Pi \setminus \pi_k, \pi_j \vdash t_{1j}} \text{DIED} \quad \frac{\Pi(\pi_j) = (t_{1j}, \cdot, \cdot) \quad \pi_j \neq \pi_k}{\Pi, \pi_k \vdash \mathbf{yield} \rightsquigarrow \Pi, \pi_j \vdash t_{1j}} \text{YIELD} \\
\\
\frac{\pi \in \text{Dom}(\Pi)}{\Pi, \pi_0 \vdash \mathbf{wait} \ \pi \rightsquigarrow \Pi, \pi_0 \vdash \mathbf{wait} \ \pi} \text{WAIT} \quad \frac{\pi \notin \text{Dom}(\Pi)}{\Pi, \pi_0 \vdash \mathbf{wait} \ \pi \rightsquigarrow \Pi, \pi_0 \vdash \emptyset} \text{WAITED} \\
\\
\frac{\Pi(\pi) = (\cdot, t_2, t_3)}{\Pi, \pi_0 \vdash \mathbf{stop} \ \pi \rightsquigarrow [\pi \mapsto (\mathbf{quit}, t_2, t_3)]\Pi, \pi_0 \vdash \mathbf{wait} \ \pi} \text{STOP} \\
\\
\frac{\Pi(\pi) = (\cdot, \cdot, t_3)}{\Pi, \pi_0 \vdash \mathbf{kill} \ \pi \rightsquigarrow [\pi \mapsto (\mathbf{die}, \emptyset, t_3)]\Pi, \pi_0 \vdash \mathbf{wait} \ \pi} \text{KILL}
\end{array}$$

Appendix B

Glossary

Bibliography

- [Bar64] Paul Baran. On Distributed Communications I: Introduction to Distributed Communications. *The RAND Corporation, Memorandum RM-3420-PR, Defense Documentation Center*, 1964.