

# Contents

<b>Preface</b>	<b>7</b>
Limit of Liability/Disclaimer of Warranty . . . . .	8
PDF & EPUB . . . . .	8
Preface . . . . .	8
Who this book is for . . . . .	8
What this book covers . . . . .	9
Contributing, Errata and Source code . . . . .	12
<b>1 Stream live cryptocurrency prices from the Binance WSS</b>	<b>13</b>
1.1 Objectives . . . . .	13
1.2 Create a new umbrella app . . . . .	13
1.3 Create a supervised application inside an umbrella . . . . .	13
1.4 Connect to Binance's WebSocket Stream using the WebSockex module . . . . .	14
1.5 Decode incoming events using the Jason module . . . . .	17
<b>2 Create a naive trading strategy - a single trader process without supervision</b>	<b>22</b>
2.1 Objectives . . . . .	22
2.2 Initializiation . . . . .	22
2.3 How trading strategy will work? . . . . .	26
<b>3 Introduce PubSub as a communication method</b>	<b>33</b>
3.1 Objectives . . . . .	33
3.2 Design . . . . .	33
3.3 Implementation . . . . .	36

<b>4 Mock the Binance API</b>	<b>38</b>
4.1 Objectives . . . . .	38
4.2 Design . . . . .	38
4.3 Create “BinanceMock” app . . . . .	40
4.4 Implement getting exchange info . . . . .	41
4.5 Implement placing buy and sell orders . . . . .	42
4.6 Implement order retrieval . . . . .	46
4.7 Implement callback for incoming trade events . . . . .	47
4.8 Upgrade trader and config . . . . .	50
4.9 Test the implementation . . . . .	52
<b>5 Enable parallel trading on multiple symbols</b>	<b>53</b>
5.1 Objectives . . . . .	53
5.2 Introduction - architectural design . . . . .	53
5.3 Implement <code>Naive.SymbolSupervisor</code> . . . . .	57
5.4 Implement <code>Naive.Leader</code> . . . . .	58
<b>6 Introduce a <code>buy_down_interval</code> to make a single trader more profitable</b>	<b>67</b>
6.1 Objectives . . . . .	67
6.2 Why we need to buy below the current price? Feature overview . . . . .	68
6.3 <code>Naive.Trader</code> implementation . . . . .	69
6.4 <code>Naive.Leader</code> implementation . . . . .	71
<b>7 Introduce a trader budget and calculating the quantity</b>	<b>73</b>
7.1 Objectives . . . . .	73
7.2 Fetch <code>step_size</code> . . . . .	73
7.3 Append <code>budget</code> and <code>step_size</code> to the <code>Trader</code> ’s state inside the <code>Leader</code> . . . . .	75
7.4 Append <code>budget</code> and <code>step_size</code> to the <code>Trader</code> ’s state . . . . .	75
7.5 Calculate quantity . . . . .	76
<b>8 Add support for multiple transactions per order</b>	<b>78</b>
8.1 Objectives . . . . .	78
8.2 The issue with the current implementation . . . . .	78
8.3 Improve buy order filled callback . . . . .	80

8.4	Implement buy order “filled” callback . . . . .	82
8.5	Improve sell order callback . . . . .	82
8.6	Test the implementation . . . . .	84
<b>9</b>	<b>Run multiple traders in parallel</b>	<b>85</b>
9.1	Objectives . . . . .	85
9.2	Describe and design the required functionality . . . . .	85
9.3	Implement rebuy inside <code>Naive.Trader</code> . . . . .	86
9.4	Implement rebuy in the <code>Naive.Leader</code> . . . . .	88
9.5	Improve logs by assigning ids to traders . . . . .	91
9.6	Test the implementation . . . . .	93
<b>10</b>	<b>Fine-tune trading strategy per symbol</b>	<b>96</b>
10.1	Objectives . . . . .	96
10.2	Describe and design the required functionality . . . . .	96
10.3	Add docker to project . . . . .	97
10.4	Set up <code>ecto</code> inside the <code>naive</code> app . . . . .	98
10.5	Create and migrate the DB . . . . .	100
10.6	Seed symbols’ settings . . . . .	103
10.7	Update the <code>Naive.Leader</code> to fetch settings . . . . .	105
<b>11</b>	<b>Supervise and autostart streaming</b>	<b>108</b>
11.1	Objectives . . . . .	108
11.2	Describe and design the required functionality . . . . .	108
11.3	Register the <code>Streamer.Binance</code> processes with names . . . . .	109
11.4	Set up <code>ecto</code> inside the <code>streamer</code> app . . . . .	110
11.5	Create and migrate the db . . . . .	111
11.6	Seed default settings . . . . .	113
11.7	Implement the supervision tree and start streaming functionality . . . . .	114
11.8	Implement the stop functionality . . . . .	116
11.9	Implement the autostart streaming functionality . . . . .	117
11.10	Test the implementation . . . . .	120

<b>12 Start, stop, shutdown and autostart trading</b>	<b>122</b>
12.1 Objectives . . . . .	122
12.2 Describe and design the required functionality . . . . .	122
12.3 (Re-)Implement the start trading functionality . . . . .	123
12.4 Implement the stop trading functionality . . . . .	126
12.5 Implement the autostart trading functionality . . . . .	127
12.6 Implement the shutdown trading functionality . . . . .	129
<b>13 Abstract duplicated supervision code</b>	<b>136</b>
13.1 Objectives . . . . .	136
13.2 Overview of requirements . . . . .	136
13.3 Pseudo generalize Core.ServiceSupervisor module . . . . .	137
13.4 Utilize pseudo generalized code inside the Naive DynamicSymbolSupervisor . . . . .	140
13.5 Implement a truly generic Core.ServiceSupervisor . . . . .	143
13.6 Remove boilerplate using <code>use</code> macro . . . . .	151
13.7 Use the Core.ServiceSupervisor module inside the <code>streamer</code> application . . . . .	157
<b>14 Store trade events and orders inside the database</b>	<b>161</b>
14.1 Objectives . . . . .	161
14.2 Overview of requirements . . . . .	161
14.3 Create a new <code>data_warehouse</code> application in the umbrella . . . . .	162
14.4 Connect to the database using Ecto . . . . .	162
14.5 Store trade events' data . . . . .	164
14.6 Store orders' data . . . . .	168
14.7 Implement supervision . . . . .	174
<b>15 Backtest trading strategy</b>	<b>184</b>
15.1 Objectives . . . . .	184
15.2 Overview of requirements . . . . .	184
15.3 Implement the storing task . . . . .	187
15.4 Test the backtesting . . . . .	190

<b>16 End-to-end testing</b>	<b>193</b>
16.1 Objectives . . . . .	193
16.2 Decide on the tested functionality . . . . .	193
16.3 Implement basic test . . . . .	195
16.4 Introduce environment based config files . . . . .	199
16.5 Add convenience aliases . . . . .	200
16.6 Cache initial seed data inside a file . . . . .	202
16.7 Update seeding scripts to use the BinanceMock . . . . .	205
16.8 Introduce the Core application . . . . .	207
<b>17 Mox rocks</b>	<b>209</b>
17.1 Objectives . . . . .	209
17.2 Introduction to mock based tests . . . . .	209
17.3 Add the <code>mox</code> package . . . . .	212
17.4 Investigate the <code>Naive.Trader</code> module . . . . .	212
17.5 Implement a test of the <code>Naive.Trader</code> module . . . . .	219
17.6 Define an alias to run unit tests . . . . .	223
<b>18 Functional Elixir</b>	<b>226</b>
18.1 Objectives . . . . .	226
18.2 The reasoning behind the functional approach . . . . .	226
18.3 Simplifying by splitting . . . . .	227
18.4 Abstracting the “pure” logic . . . . .	231
18.5 Dealing with dirty code . . . . .	241
18.6 Making dirty code testable . . . . .	242
18.7 The power <code>with-in</code> . . . . .	245
18.8 Do or not to do . . . . .	247
18.9 Final thoughts . . . . .	248
<b>19 Idiomatic OTP</b>	<b>249</b>
19.1 Objectives . . . . .	249
19.2 The concept . . . . .	249
19.3 Initial implementation . . . . .	250
19.4 Idiomatic solution . . . . .	256

<b>20 Idiomatic trading strategy</b>	<b>261</b>
20.1 Objectives . . . . .	261
20.2 Following the OHLC footsteps . . . . .	261
20.3 Simplifying the Naive supervision tree . . . . .	262
20.4 Supporting multiple positions . . . . .	264
20.5 Retrofitting the “shutdown” functionality . . . . .	274
20.6 Updating the Strategy to handle rebuys . . . . .	279
20.7 Fetching active positions . . . . .	281
20.8 Tidying up . . . . .	283
20.9 Final thoughts . . . . .	283