330.232

IT-based Management

CPPI & PDCA

Lecturer

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1. Design

a. Iceberglist

The following list displays the tasks to be performed in order of importance, detailing the amount of time needed and the responsible team member.

Table 1: Iceberglist

id		Feature User Story or Technical Task (choose one)	Expected time exposure (h)	Version (when will it be finished?)	Person Responsible
1	Planning	Iceberglist	1	-	Maria/Bárbara
2		Activity Diagram	3	-	Maria
3		Sequence Diagram	3	-	Bárbara
4	Development	Create the interface (User interface)	3	0.5	Mustafa
5		Connection (with user's interface; external source in order to obtain the current stock market price information)	3	0.6	Michael
6		Connection: external source in order to obtain the current stock market price information)	3	0.4	Sevastiyan
7		Data storage (code the formulas)	2	0.2	Mustafa
8		Data storage (Display the calculation values)	2	0.3	Michael
9		Facilitate the execution of the Calculations	2	0.1	Sevastiyan
10	Testing	Obtain the testing samples	2	0.6	Maria/Bárbara
11		Do the testing	4	1	Edon

b. Management Activity Diagram

The Management Activity Diagram explains the CPPI procedure, as well as demonstrates the necessary formulas will be stored and executed.

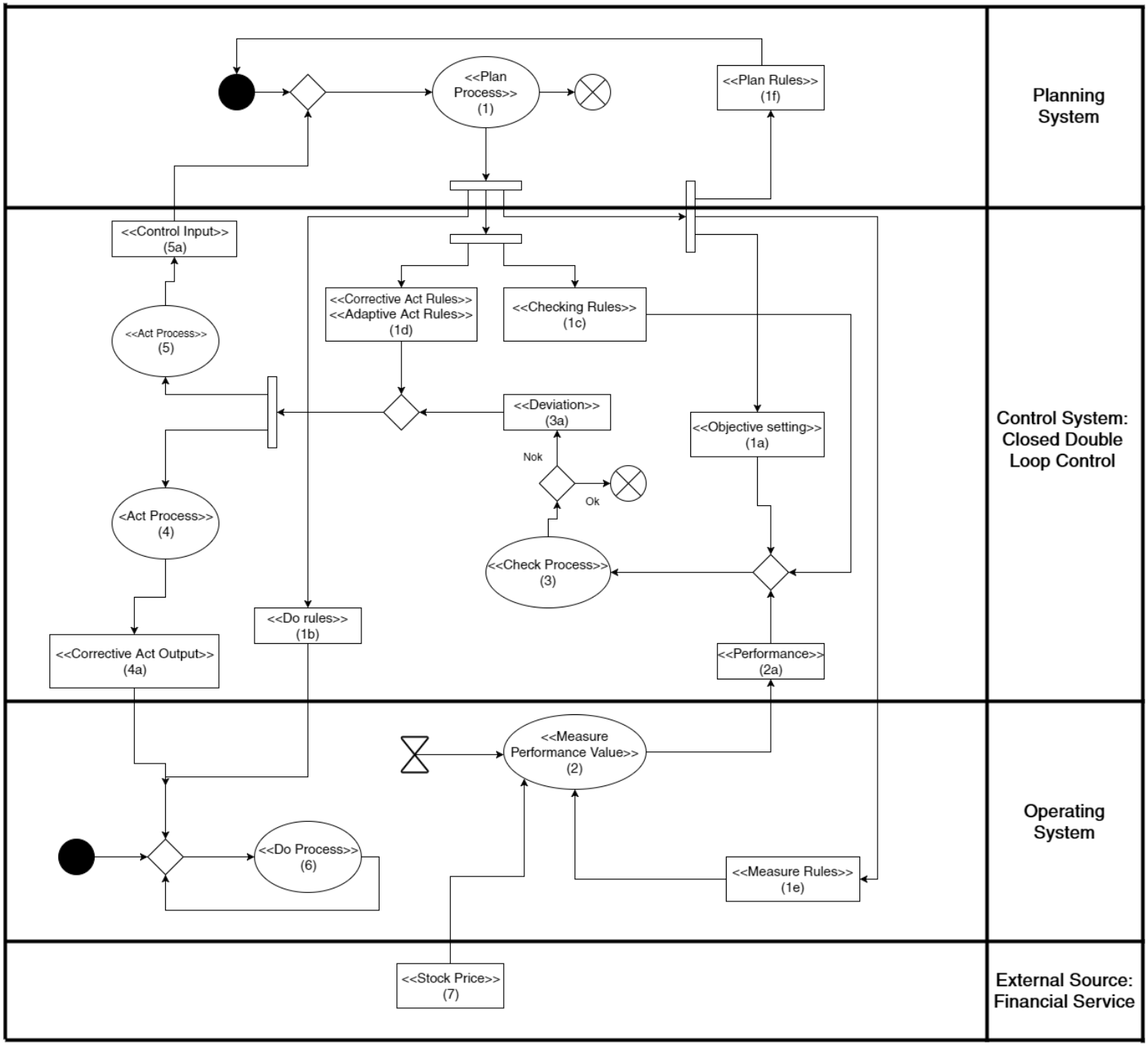

Figure 1: Managing Activity Diagram

1. Plan-Activity:

1a) Objective setting: Present value of the floor (F_t) at time t

1b) Do Rules: Outcome of the planning phase. Rules to decision to invest or not based on the calculated values.

1c) Checking Rules: Formula definition to calculate the cushion at t (C_t) via investor's wealth (W_{et}) and max-operator:

$$C_t = \max(W_t - F_t; 0)$$

Storage of values inserted by the user:

- Portfolio floor value (F_T)
- Multiplier (m)
- Maximum risky fraction (b)
- Initial investment (W_t, with t=0)
- Time horizon (T)

1d) Corrective and Adaptive Act Rules: Formula definition to calculate the risky exposure ($X_{r,t}$)(via min-operator, multiplier (m) and maximum risky fraction (b)) and the riskless (riskfree) exposure ($X_{f,t}$):

$$X_{r,t} = \min(m * C_t; b * W_t)$$

$$X_{f,t} = W_t - X_{r,t}$$

1e) Measure Rules:

- Formula definition to calculate the investor's wealth in current period:

$$W_t = X_{r,t-1} * (1 + TSR_t) + X_{f,t-1} * (1 + R_0)^{1/365}$$

- Formula definition to calculate the Total Share Return (TSR) via stock prices (S_t):

$$TSR_t = \frac{S_t}{S_{t-1}} - 1$$

- Formula definition to calculate the present value of the floor (F_t) at time t

$$F_t = \frac{F_T}{(1 + R_t)^{T_{t,T}}}$$

1f) Plan Rules: Implementation of the plan rules

2. Measure Activity (<<Measure Performance Value>>)

Calculation of TSR_t, F_t, and W_t

2a) Performance: Measurement output (W_t).

3. **Check-Activity** (<<Check Process>>)

   Calculation of C_t

   3a) Deviation: Check activity output (C_t).

4. **Corrective Act-Activity**

   4a) Corrective Act Output – Closed Loop Control Input

   Calculation of risky exposure ($X_{r,t}$) and riskless exposure ($X_{f,t}$).

5. **Adaptive Act Activity**

   5a) Control Input – Closed Loop Control Input

6. **Do-Activity:** Decision to invest or not.

7. **External source:** Stock Price values

c. UML Sequence Diagrams

The following UML Sequence Diagrams describe the interactions between the components as well as between major components over time for all relevant communications.

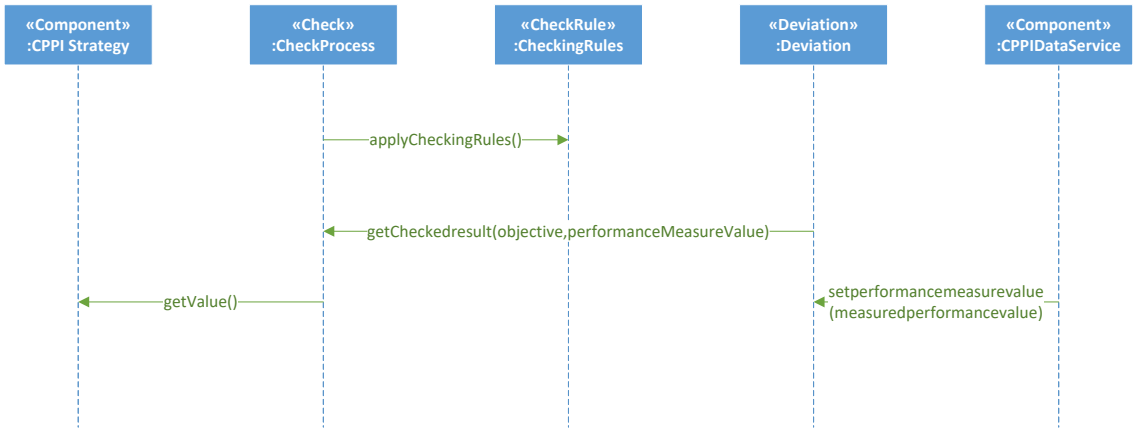

Figure 2: UML Sequence Diagram - Check Process

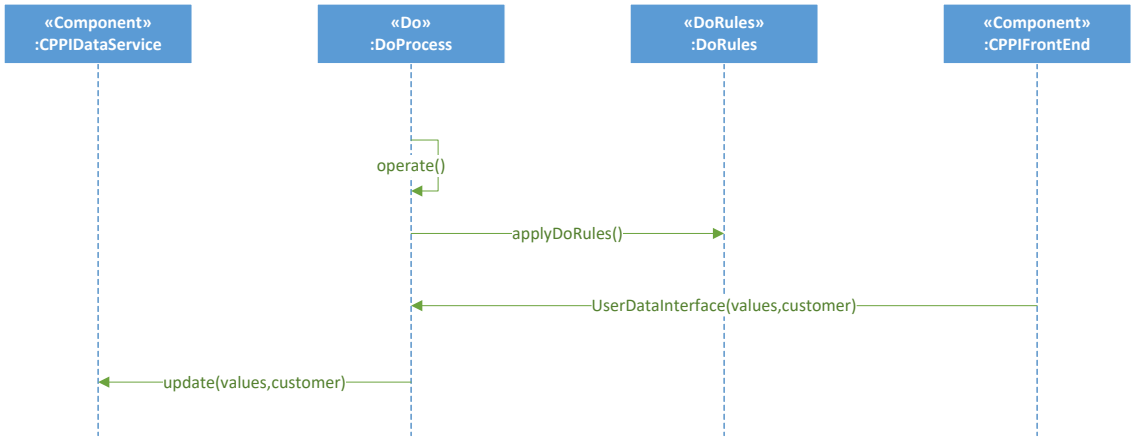

Figure 3: UML Sequence Diagram - Do Process

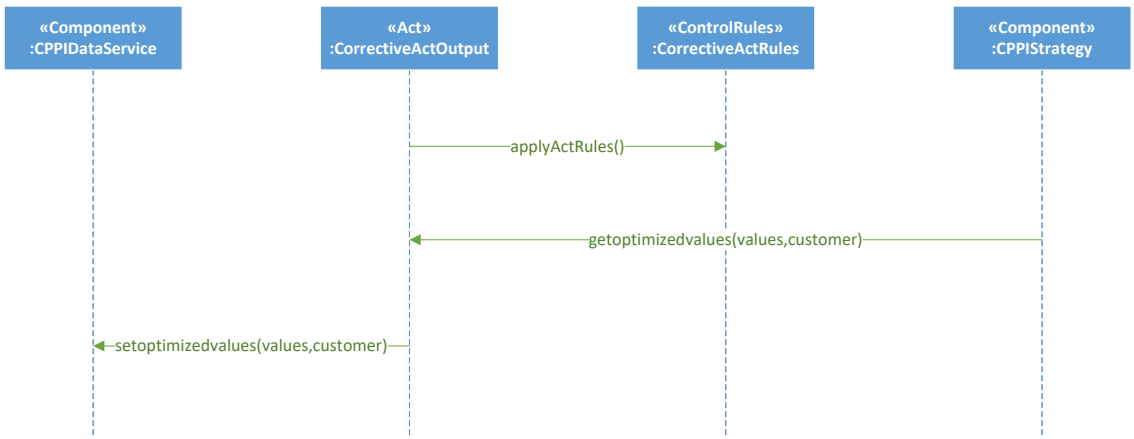

Figure 4: UML Sequence Diagram - Act Corrective Process

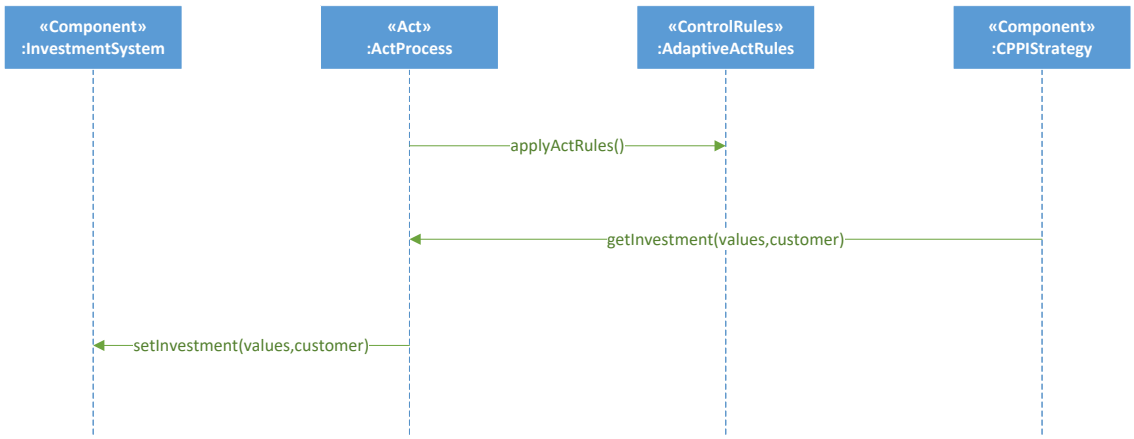

Figure 5: UML Sequence Diagram - Act Adaptive Process