Übungsblatt 11
„Künstliche Intelligenz“

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1 Forward Chaining

1. If X chirps and sings then X is a canary.
2. If X is a canary then X is yellow.
3. Tweety eats flies.
4. Tweety chirps.
5. Tweety sings.
6. Tweety is yellow.

1.1 Teilaufgabe a)

Substituiere alle X mit Tweety, fr die die Aussage wahr wird.

If Tweety chirps (4) and sings (5) then Tweety is a canary.

1.2 Teilaufgabe b)

1) substituiere X durch Tweety
2) if Tweety chirps and sings $\Rightarrow$ if Tweety chirps $\wedge$ if Tweety sings
3) Tweety chirps (4) $\Rightarrow$ true
4) Tweety sings (5) $\Rightarrow$ true
5) 3) $\wedge$ 4) $\Rightarrow$ then Tweety is a canary.

1.3 Teilaufgabe c)

Forward Chaining

- dynamisches, datengesteuertes Verfahren
- generiert neues Faktenwissen (auch unntiges)
- gut geeignet fr unsichere Ziele und Auswahlmglichkeiten

Backward Chaining

- statisches, zielgesteuertes Verfahren
- Beweisrichtung: vom Ziel zu den Fakten
- gut geeignet wenn alle Ziele und Auswahlmglichkeiten bekannt sind

2 Produktionssystem

```
1  initial_data([goal(select_budget),
2      not_end_yet,
3      legal_budgets([
4          high_end,
5          mid_end,
6          low_end]),
7      cpu(low_end, [i3]),
8      cpu(mid_end, [i3, i5]),
9      cpu(high_end, [i3, i5, i7]),
10     gpu(low_end, [gpu_onboard]),
11     gpu(mid_end, [gpu_onboard, gpu_extern]),
12     gpu(high_end, [gpu_onboard, gpu_extern, gpu_water_cooled]),
13     harddrive(low_end, [hdd]),
14     harddrive(mid_end, [hdd, ssd]),
15     harddrive(high_end, [hdd, ssd]).
16
17 % Select your budget
18 rule 100:
19     [1: goal(select_budget),2: legal_budgets(LT)] ==>
20     [retract(1), nl, write('Select a budget:'),nl,nl,
21     write('Available budgets are:'),nl,write(LT),nl,nl,
22     assert(goal(read_budget))].
23
24 rule 101:
25     [1: goal(read_budget),2: legal_budgets(LB)] ==>
26     [prompt('budget> ', B), member(B,LB), retract(1),
27     assert(budget(B)), assert(goal(assemble_cpu))].
28
```

```
rule 102:
    [1: goal(read_budget),2: legal_budgets(LT)] ==>
    [nl,write('Unknown. Select one of these:'),nl,
    write(LT)].

% CPU
rule 200:
    [1: goal(assemble_cpu),2: budget(B),cpu(B,CPU)] ==>
    [retract(1), nl, write('Select cpu. Your budget '),
    write(B), write(' allows for the following parts:'),nl,
    write(CPU),nl,nl,assert(goal(pick_cpu))].

rule 201:
    [1: goal(pick_cpu),2: budget(B),cpu(B, C)] ==>
    [prompt('cpu> ', CPU),member(CPU,C),retract(1),
    assert(picked_cpu(CPU)),assert(goal(assemble_gpu))].

rule 202:
    [1: goal(pick_cpu),2: budget(B),cpu(B,CPU)] ==>
    [write('Your cpu seems to not fit your budget. Choose from the following:'),nl,
    write(CPU),nl].

%GPU
rule 200:
    [1: goal(assemble_gpu),2: budget(B),gpu(B,GPU)] ==>
    [retract(1),nl, write('Pick your gpu. Your budget '),
    write(B),write(' allows for the following parts:'),nl,
    write(GPU),nl,nl,assert(goal(pick_gpu))].

rule 201:
    [1: goal(pick_gpu),2: budget(B),gpu(B, G)] ==>
    [prompt('gpu> ', GPU),member(GPU,G),retract(1),
    assert(picked_gpu(GPU)),assert(goal(assemble_harddrive))].

rule 202:
    [1: goal(pick_gpu),2: budget(B), gpu(B,GPU)] ==>
    [nl,write('Your gpu seems to not fit your budget. Choose from the following:'),nl,
    write(GPU),nl].

% Hardrive
rule 300:
    [1: goal(assemble_harddrive),2: budget(B),harddrive(B,HDD)] ==>
    [retract(1),nl, write('Pick your harddrive. Your budget '),
    write(B), write(' allows for the following parts:'),nl,
    write(HDD),nl,nl, assert(goal(pick_harddrive))].

rule 301:
    [1: goal(pick_harddrive),2: budget(B),harddrive(B, G)] ==>
    [prompt('harddrive> ', HDD), member(HDD,G), retract(1),
    assert(picked_harddrive(HDD)), assert(goal(show_pc))].

rule 302:
    [1: goal(pick_harddrive),2: budget(B),harddrive(B,HDD)] ==>
    [nl,write('Your harddrive seems to not fit your budget. Choose from the following:'),nl,
```

```
83      write(HDD),nl].
84
85  % Show the results
86  rule 600:
87      [1: goal(show_pc),picked_cpu(CPU),picked_gpu(GPU),picked_harddrive(HDD)]
88      ==> [retract(all),  nl,write('Your configuration looks as follows:'),nl,↩
            nl,
89      write('CPU: '),write(CPU),nl, write('GPU: '),write(GPU),nl, write('↩
            Harddrive: '),write(HDD),nl.
```