Example: Scheduling Tasks

1. $M = \{(a,c),(a,f),(a,g),(b,d),(b,f),(c,a),(d,b),(d,e),(e,d),(f,a),(f,b),(g,a)\}$;
   pair selected: (a,c);
   $a = c - 1$, hence $D_a = \{\text{M}, \text{Tu}, \text{W}, \text{Th}\}$;
   Do we have any other (*, a)? - Yes, but (f,a) and (g,a) are already in M, so nothing to do.

2. $M = \{(a,f),(a,g),(b,d),(b,f),(c,a),(d,b),(d,e),(e,d),(f,a),(f,b),(g,a)\}$;
   pair selected: (a,f);
   $a = f + 2$, hence $D_a = \{\text{W}, \text{Th}\}$;
   Do we have any other (*, a)? - Yes, but (c,a) and (g,a) are already in M, so nothing to do.

3. $M = \{(a,g),(b,d),(b,f),(c,a),(d,b),(d,e),(e,d),(f,a),(f,b),(g,a)\}$;
   pair selected: (a,g);
   $a = g$, hence no modification on the domain of a;
   no insertion into M.

Example: Scheduling Tasks

4. $M = \{(b,d),(b,f),(c,a),(d,b),(d,e),(e,d),(f,a),(f,b),(g,a)\}$;
   pair selected: (b,d);
   $b = d - 1$, hence $D_b = \{\text{M}, \text{Tu}, \text{W}, \text{Th}\}$;
   Do we have any other (*, b)? - Yes, but (f,b) is already in M, so nothing to do.

5. $M = \{(b,f),(c,a),(d,b),(d,e),(e,d),(f,a),(f,b),(g,a)\}$;
   pair selected: (b,f);
   $b = f + 1$, hence $D_b = \{Tu, W, Th\}$;
   Do we have any $(*, b)$? - Yes, but (d,b) is already in M, so nothing to do.

6. $M = \{(c,a),(d,b),(d,e),(e,d),(f,a),(f,b),(g,a)\}$;
   pair selected: (c,a);
   $c = a + 1$, hence $D_c = \{Th, F\}$;
   Do we have any $(*, c)$? - No, so no modification on M.

7. $M = \{(d,b),(d,e),(e,d),(f,a),(f,b),(g,a)\}$;
   pair selected: (d,b);
   $d = b + 1$, hence $D_d = \{W, Th, Fr\}$;
   Do we have any $(*, d)$? - Yes, but (e,d) is already in M, so nothing to do.

Example: Scheduling Tasks

8. $M = \{(d,e),(e,d),(f,a),(f,b),(g,a)\}$;
   pair selected: (d,e);
   $d = e - 2$, so $D_d = \{W\}$;
   Do we have any $(*,d)$? - Yes, so we add (b,d) to M.

9. $M = \{(e,d),(f,a),(f,b),(g,a),(b,d)\}$;
   pair selected: (e,d);
   $e = d + 2$ hence $D_e = \{F\}$;
   Do we have any $(*,e)$? - No, so no modification on M.

10. $M = \{(f,a),(f,b),(g,a),(b,d)\}$;
    pair selected: (f,a);
    $f = a - 2$ hence $D_f = \{M, Tu\}$;
    Do we have any $(*,f)$? - Yes, so we add (b,f) to M.

11. $M = \{(f,b),(g,a),(b,d),(b,f)\}$;
    pair selected: (f,b);
    $f = b - 1$, hence no modification on the domain of f;
    no insertion into M.

12. $M = \{(g,a),(b,d),(b,f)\}$;
    pair selected: (g,a);
    $g = a$, hence $D_g = \{W, Th\}$;
    Do we have any $(*,g)$? - No, so no modification on M.

Example: Scheduling Tasks

13. $M = \{(b, d), (b, f)\}$;
pair selected: (b, d);
$b = d - 1$ hence $D_b = \{Tu\}$;
Do we have any $(*, b)$? - Yes, so we add (f, b) to M.

14. $M = \{(b, f), (f, b)\}$;
pair selected: (b, f);
$b = f + 1$, hence no modification on the domain of f;
no insertion into M.

15. $M = \{(f, b)\}$;
pair selected: (f, b);
$f = b - 1$, hence $D_f = \{M\}$;
Do we have any $(*, f)$? Yes, so we add (a, f) to M.

16. $M = \{(a, f)\}$;
pair selected: (a, f);
$a = f + 2$, hence $D_a = \{W\}$;
Do we have any $(*, a)$? Yes, so we add (c, a) and (g, a) to M.

Example: Scheduling Tasks

17. $M = \{(c, a), (g, a)\}$;
    pair selected: (c, a);
    $c = a + 1$, hence $D_c = \{Th\}$;
    Do we have any $(*, c)$? No, so no insertion into M.

18. $M = \{(g, a)\}$;
    pair selected: (g, a);
    $g = a$, hence $D_g = \{W\}$;
    Do we have any $(*, g)$? No, so no insertion into M.

19. M empty; return modified γ :
    $D_a = \{W\}$
    $D_b = \{Tu\}$
    $D_c = \{Th\}$
    $D_d = \{W\}$
    $D_e = \{F\}$
    $D_f = \{M\}$
    $D_g = \{W\}$

Example: Constraint Network

(Solution) The variable ordering is: d, a, b, c, e, f, g. The constraint graph and the directed tree are given in the Figures 1 and 2 below:

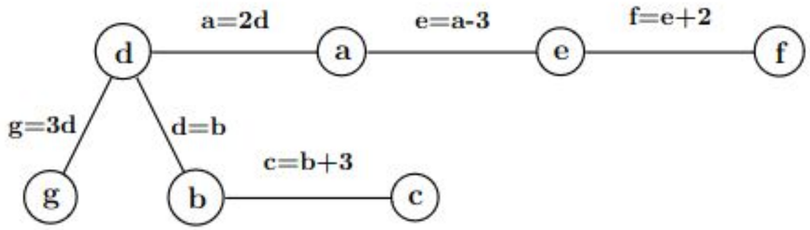
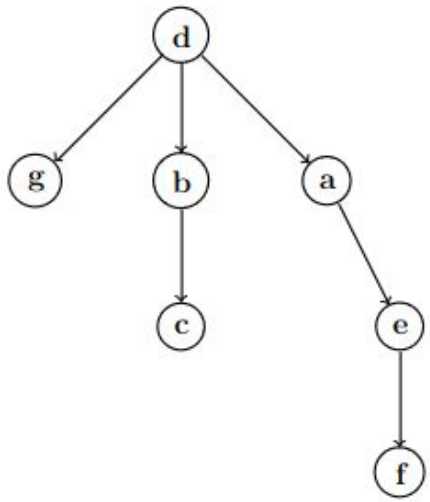


Figure 1: The constraint graph



Example: Constraint Network

The calls to $Revise(\gamma, v_{parent(i)}, v_i)$ and the resulting domains are:

- $i = 7 : Revise(\gamma, d, g), g = 3d : D_d = \{1, 2\}$
- $i = 6 : Revise(\gamma, e, f), f = e + 2 : D_e = \{1, 2, 3, 4\}$
- $i = 5 : Revise(\gamma, a, e), e = a - 3 : D_a = \{4, 5, 6\}$
- $i = 4 : Revise(\gamma, b, c), c = b + 3 : D_b = \{1, 2, 3\}$
- $i = 3 : Revise(\gamma, d, b), d = b : D_d = \{1, 2\}$
- $i = 2 : Revise(\gamma, d, a), a = 2d : D_d = \{2\}$

BackTrackingWithInference; possible D'_{v_i} and $d \in D'_{v_i}$ are:

- $D'_d = \{2\}; d = 2$
- $D'_a = \{4\}; d = 4$
- $D'_b = \{2\}; d = 2$
- $D'_c = \{5\}; d = 5$
- $D'_e = \{1\}; d = 1$
- $D'_f = \{3\}; d = 3$
- $D'_g = \{6\}; d = 6$