```
P = 4, Q = 6, R = 8
precedes x precedes ->
Allen* relations : 1 elts
precedes (1 elts) Min = [0,0,0,0] Max = [0,0,0,0]
Allen* Min = precedes [0,0,0,0] , Max = precedes [0,0,0,0]
precedes x preceded_by ->
Allen* relations : 3649 elts
precedes (1 elts) Min = [0,0,0,0] Max = [0,0,0,0]
preceded by (1 elts)
start (6 elts) Min = [1,2,5,6]
started_by (54 elts)
finishes (6 elts)
finished_by (54 elts)
meets (98 elts)
met_by (98 elts)
overlaps (98 elts)
overlapped by (98 elts)
during (6 elts)
contains (169 elts)
Allen* Min = precedes [0,0,0,0] , Max = preceded_by [16,16,16,16]
precedes x start ->
Allen* relations : 41 elts
precedes (1 elts) Min = [0,0,0,0] Max = [0,0,0,0]
Allen* Min = precedes [0,0,0,0] , Max = precedes [0,0,0,0]
precedes x started_by ->
Allen* relations : 41 elts
precedes (1 elts) Min = [0,0,0,0] Max = [0,0,0,0]
Allen* Min = precedes [0,0,0,0] , Max = precedes [0,0,0,0]
precedes x finishes ->
Allen* relations : }129\mathrm{ elts
precedes (1 elts) Min = [0,0,0,0] Max = [0,0,0,0]
start (1 elts) Min = [1,2,5,6] Max = [1,2,5,6][9,10,13,14]
meets (3 elts) Min = [0,1,2,5] Max = [0,1,4,5][8,9,12,13]
overlaps (3 elts) Min = [0,2,2,6] Max = [0,2,4,6][8,10,12,14]
during (1 elts) Min = [2,2,6,6] Max = [2,2,6,6][10,10,14,14]
Allen* Min = precedes [0,0,0,0] , Max = during [2,2,6,6] [10,10,14,14]
precedes x finished_by ->
Allen* relations : 41 elts
precedes (1 elts) Min = [0,0,0,0] Max = [0,0,0,0]
Allen* Min = precedes [0,0,0,0] , Max = precedes [0,0,0,0]
precedes x meets ->
Allen* relations : 41 elts
precedes (1 elts) Min = [0,0,0,0] Max = [0,0,0,0]
Allen* Min = precedes [0,0,0,0] , Max = precedes [0,0,0,0]
precedes x met_by ->
Allen* relations : 129 elts
precedes (1 elts) Min = [0,0,0,0] Max = [0,0,0,0]
start (1 elts) Min = [1,2,5,6] Max = [1,2,5,6][9,10,13,14]
meets (3 elts) Min = [0,1,2,5] Max = [0,1,4,5][8,9,12,13]
overlaps (3 elts) Min = [0,2,2,6] Max = [0,2,4,6][8,10,12,14]
during (1 elts) Min = [2,2,6,6] Max = [2,2,6,6][10,10,14,14]
Allen* Min = precedes [0,0,0,0] , Max = during [2, 2,6,6] [10,10,14,14]
precedes x overlaps ->
Allen* relations : 41 elts
precedes (1 elts) Min = [0,0,0,0] Max = [0,0,0,0]
Allen* Min = precedes [0,0,0,0] , Max = precedes [0,0,0,0]
precedes x overlapped_by ->
```

Allen* relations : 129 elts
precedes (1 elts) Min $=[0,0,0,0] \quad$ Max $=[0,0,0,0]$
start (1 elts)
$\operatorname{Min}=[1,2,5,6] \quad$ Max $=[1,2,5,6][9,10,13,14]$
Min $=[0,1,2,5] \quad$ Max $=[0,1,4,5][8,9,12,13]$
Min $=[0,2,2,6] \quad$ Max $=[0,2,4,6][8,10,12,14]$
overlaps (3 elts)
$\operatorname{Min}=[2,2,6,6]$
Max $=[2,2,6,6][10,10,14,14]$
Allen* Min $=$ precedes $[0,0,0,0], \operatorname{Max}=$ during $[2,2,6,6][10,10,14,14]$
precedes x during ->
Allen* relations : 129 elts
precedes (1 elts) $\quad \operatorname{Min}=[0,0,0,0] \quad \operatorname{Max}=[0,0,0,0]$
start (1 elts) $\quad \operatorname{Min}=[1,2,5,6$
Max $=[1,2,5,6][9,10,13,14]$
meets (3 elts) $\quad \operatorname{Min}=[0,1,2,5] \quad$ Max $=[0,1,4,5][8,9,12,13]$
overlaps (3 elts) $\quad \operatorname{Min}=[0,2,2,6] \quad \operatorname{Max}=[0,2,4,6][8,10,12,14]$
during (1 elts) $\quad \operatorname{Min}=[2,2,6,6] \quad \operatorname{Max}=[2,2,6,6][10,10,14,14]$
Allen* Min $=$ precedes $[0,0,0,0], \operatorname{Max}=$ during $[2,2,6,6][10,10,14,14]$
precedes x contains ->
Allen* relations : 41 elts
precedes (1 elts) Min $=[0,0,0,0] \quad \operatorname{Max}=[0,0,0,0]$
Allen* Min $=$ precedes $[0,0,0,0], \operatorname{Max}=\operatorname{precedes}[0,0,0,0]$
precedes x subset ->
Allen* relations : 41 elts
precedes (1 elts) Min $=[0,0,0,0] \quad$ Max $=[0,0,0,0]$
Allen* Min $=$ precedes $[0,0,0,0], \operatorname{Max}=\operatorname{precedes}[0,0,0,0]$
----------------
preceded_by x precedes ->
Allen* relations : 3649 elts
precedes (1 elts) Min $=[0,0,0,0] \quad$ Max $=[0,0,0,0]$
preceded_by (1 elts) $\quad$ Min $=[16,16,16,16]$
Max $=[16,16,16,16]$
start (6 elts) Min $=[1,2,5,6]$
Max $=[9,10,13,14]$
started_by (54 elts)
finishes (6 elts)
Min $=[1,4,5,8] \quad \operatorname{Max}=[9,12,13,16]$
$\operatorname{Min}=[2,3,6,7] \quad$ Max $=[10,11,14,15]$
finished_by (54 elts)
Min $=[0,3,4,7]$
$\operatorname{Max}=[8,11,12,15]$
meets (98 elts) $\quad \operatorname{Min}=[0,1,2,5]$
met_by (98 elts) $\quad$ Min $=[3,4,7,8]$
Max $=[8,9,12,13]$
Min $=[3,4,7,8] \quad$ Max $=[11,14,15,16]$
overlaps (98 elts)
overlapped_by (98 elts)
Min $=[0,2,2,6] \quad \operatorname{Max}=[8,10,12,14]$
$\operatorname{Min}=[2,4,6,8] \quad$ Max $=[10,14,14,16]$
during (6 elts)
contains (169 elts)
Min $=[2,2,6,6]$
$\operatorname{Max}=[10,10,14,14]$
Max $=[8,12,12,16]$
subset (6 elts) Min = [1,3,5,7] Max = [9,11,13,15]
Allen* Min $=$ precedes $[0,0,0,0]$, Max $=$ preceded_by $[16,16,16,16]$
preceded_by x preceded_by ->
Allen* relations : 1 elts
preceded by (1 elts) Min $=[16,16,16,16] \quad$ Max $=[16,16,16,16]$
Allen* Mín = preceded_by $[16,16,16,16]$, Max $=$ preceded_by $[16,16,16,16]$
preceded_by x start ->
Allen* relations : 129 elts
preceded_by (1 elts) Min $=[16,16,16,16] \quad$ Max $=[16,16,16,16]$
finishes (1 elts) $\quad \operatorname{Min}=[10,11,14,15][2,3,6,7] \quad \operatorname{Max}=[10,11,14,15]$
met_by (3 elts) $\quad$ Min $=[11,12,15,16][3,4,7,8] \quad \operatorname{Max}=[11,14,15,16]$
overlapped_by (3 elts) $\quad \operatorname{Min}=[10,12,14,16][2,4,6,8] \quad \operatorname{Max}=[10,14,14,16]$
during (1 elts) $\quad \operatorname{Min}=[10,10,14,14][2,2,6,6] \quad \operatorname{Max}=[10,10,14,14]$
Allen* Min $=$ during $[10,10,14,14][2,2,6,6]$, Max $=$ preceded_by $[16,16,16,16]$
--------------
preceded_by x started_by ->
Allen* rēlations : 41 - elts
preceded_by (1 elts) Min = [16,16,16,16] Max $=[16,16,16,16]$
Allen* Mín $=$ preceded_by $[16,16,16,16]$, Max $=$ preceded_by $[16,16,16,16]$
preceded_by x finishes ->
Allen* relations : 41 elts
preceded by (1 elts) Min = $\quad$ Max $=[16,16,16,16] \quad$ (16,16,16]
Allen* $\operatorname{Mi} \mathrm{n}=$ preceded_by $[16,16,16,16], \operatorname{Max}=$ preceded_by $[16,16,16,16]$
preceded_by x finished_by ->
Allen* relations : 41 elts
preceded by (1 elts) Min = [16,16,16,16] Max $=[16,16,16,16]$
Allen* Min = preceded_by $[16,16,16,16]$, Max = preceded_by $[16,16,16,16]$
preceded_by x meets ->
Allen* relations : 129 elts
preceded_by (1 elts) $\quad \operatorname{Min}=[16,16,16,16] \quad$ Max $=[16,16,16,16]$
finishes (1 elts) $\quad \operatorname{Min}=[10,11,14,15][2,3,6,7] \quad \operatorname{Max}=[10,11,14,15]$
met_by (3 elts) $\quad \operatorname{Min}=[11,12,15,16][3,4,7,8] \quad \operatorname{Max}=[11,14,15,16]$
overlapped_by (3 elts) $\quad \operatorname{Min}=[10,12,14,16][2,4,6,8] \quad \operatorname{Max}=[10,14,14,16]$
during (1 elts) $\quad \operatorname{Min}=[10,10,14,14][2,2,6,6] \quad \operatorname{Max}=[10,10,14,14]$
Allen* Min $=$ during $[10,10,14,14][2,2,6,6]$, Max $=$ preceded_by $[16,16,16,16]$
preceded by x met by ->
Allen* relations : 41 elts
preceded_by (1 elts) Min = [16,16,16,16] Max $=[16,16,16,16]$
Allen* Mīn $=$ preceded_by $[16,16,16,16]$, Max $=$ preceded_by $[16,16,16,16]$
preceded by x overlaps ->
Allen* relations : 129 elts
preceded_by (1 elts) $\quad$ Min $=[16,16,16,16] \quad$ Max $=[16,16,16,16]$
finishes (1 elts) $\quad \operatorname{Min}=[10,11,14,15][2,3,6,7] \quad \operatorname{Max}=[10,11,14,15]$
met_by (3 elts) $\quad$ Min $=[11,12,15,16][3,4,7,8] \quad$ Max $=[11,14,15,16]$
overlapped_by (3 elts) $\quad \operatorname{Min}=[10,12,14,16][2,4,6,8] \quad \operatorname{Max}=[10,14,14,16]$
during (1 elts) $\quad \operatorname{Min}=[10,10,14,14][2,2,6,6] \quad \operatorname{Max}=[10,10,14,14]$
Allen* Min $=$ during $[10,10,14,14][2,2,6,6]$, Max $=$ preceded_by $[16,16,16,16]$
preceded by x overlapped by ->
Allen* relations : 41 elts
preceded_by (1 elts) Min = [16,16,16,16] Max $=[16,16,16,16]$
Allen* Mín $=$ preceded_by $[16,16,16,16]$, Max $=$ preceded_by $[16,16,16,16]$
preceded by x during ->
Allen* relations : 129 elts
preceded_by (1 elts) Min = [16,16,16,16] Max $=[16,16,16,16]$
finishes (1 elts) $\quad \operatorname{Min}=[10,11,14,15][2,3,6,7] \quad \operatorname{Max}=[10,11,14,15]$
met_by (3 elts) $\quad \operatorname{Min}=[11,12,15,16][3,4,7,8] \quad \operatorname{Max}=[11,14,15,16]$
overlapped_by (3 elts) $\quad \operatorname{Min}=[10,12,14,16][2,4,6,8] \quad \operatorname{Max}=[10,14,14,16]$
during (1 elts) $\quad \operatorname{Min}=[10,10,14,14][2,2,6,6] \quad \operatorname{Max}=[10,10,14,14]$
Allen* Min = during $[10,10,14,14][2,2,6,6]$, Max $=$ preceded_by $[16,16,16,16]$
preceded by x contains ->
Allen* relations : 41 elts
preceded_by (1 elts) Min $=[16,16,16,16] \quad$ Max $=[16,16,16,16]$
Allen* Min $=$ preceded_by $[16,16,16,16]$, Max $=$ preceded_by $[16,16,16,16]$
preceded_by x subset ->
Allen* relations : 41 elts
preceded_by (1 elts) Min = [16,16,16,16] Max $=[16,16,16,16]$
Allen* Mín $=$ preceded_by $[16,16,16,16]$, Max $=$ preceded_by $[16,16,16,16]$
Allen
start x precedes ->
Allen* relations : 1 elts
precedes (1 elts) $\quad \operatorname{Min}=[0,0,0,0] \quad \operatorname{Max}=[0,0,0,0]$
Allen* Min $=$ precedes $[0,0,0,0], \operatorname{Max}=\operatorname{precedes}[0,0,0,0]$
-----------------
start x preceded_by ->
Allen* relations : 1 elts
preceded_by (1 elts) Min = [16,16,16,16] Max $=[16,16,16,16]$
Allen* Mīn = preceded_by $[16,16,16,16]$, Max = preceded_by $[16,16,16,16]$
start x start
start x start ->
Allen* relations : 6 elts
start (6 elts) Min = [1,2,5,6] Max = [9,10,13,14]
Allen* Min $=\operatorname{start}[1,2,5,6], \operatorname{Max}=\operatorname{start}[9,10,13,14]$

```
start x started_by ->
Allen* relations : 126 elts
start (6 elts) Min = [1,2,5,6] Max = [9,10,13,14]
started_by (30 elts) Min = [1,4,5,8] Max = [9,12,13,16]
subset (6 elts) Min = [1,3,5,7] Max = [9,11,13,15]
Allen* Min = start [1,2,5,6] , Max = started_by [9,12,13,16]
start x finishes ->
Allen* relations : 6 elts
during (6 elts) Min = [2,2,6,6] Max = [10,10,14,14]
Allen* Min = during [2,2,6,6] , Max = during [10,10,14,14]
start x finished_by ->
Allen* relations : 360 elts
meets (30 elts) Min = [0,1,4,5][0,1,2,5] Max = [8,9,12,13]
overlaps (30 elts) Min = [0,2,4,6][0,2,2,6] Max = [8,10,12,14]
Allen* Min = meets [0,1,4,5] [0,1,2,5], Max = overlaps [8,10,12,14]
start x meets ->
Allen* relations : 340 elts
finishes (3 elts) Min = [2,3,6,7] Max = [6,7,10,11][10,11,14,15]
met by (11 elts) Min = [3,4,7,8] Max = [7,8,11,12][11,14,15,16]
overlapped_by (11 elts) Min = [2,4,6,8] Max = [6,8,10,12][10,14,14,16]
during (3 elts) Min = [2,2,6,6] Max = [6,6,10,10][10,10,14,14]
Allen* Min = during [2,2,6,6] , Max = met_by [7,8,11,12] [11,14,15,16]
<
start x met_by ->
Allen* relations : 80 elts
meets (5 elts) Min = [3,5,7,9][0,1,2,5] Max = [7,9,11,13][8,9,12,13]
met_by (80 elts)
Min = [3,4,7,8] Max = [11,14,15,16]
overlaps (5 elts) Min = [3,6,7,10][0,2,2,6]
Max = [7,10,11,14][8,10,12,14]
Allen* Min = met_by [3,4,7,8] , Max = met_by [11,14,15,16]
start x overlaps ->
Allen* relations : }1136\mathrm{ elts
finishes (3 elts) Min = [2,3,6,7] Max = [6,7,10,11][10,11,14,15]
meets (80 elts) Min = [0,1,2,5]
met_by (51 elts) Min = [3,4,7,8]
Min = [3,4,7,8] Max = [7,10,11,14][11,14,15,16]
overlaps (80 elts) Min = [0,2,2,6]
Min = [2,4,6,8] Max = [6,10,10,14][10,14,14,16]
overlapped_by (51 elts
Min = [2,4,6,8]
during (3 elts) Min = [2,2,6,6]
Max = [6,6,10,10][10,10,14,14]
Allen* Min = meets [0,1,2,5] , Max = overlaps [8,10,12,14]
start x overlapped_by ->
Allen* relations : 204 elts
finishes (6 elts) Min = [2,3,6,7] Max = [10,11,14,15]
meets (5 elts)
overlaps (5 elts)
overlapped_by (80 elts)
during (6 elts)
Min = [2,5,6,9][0,1,2,5]
Min = [2,6,6,10][0,2,2,6]
Min = [2,4,6,8]
Min = [2,2,6,6]
Max = [6,9,10,13][8,9,12,13]
Max = [6,10,10,14][8,10,12,14]
Allen* Min = during [2,2,6,6] , Max = overlapped_by [10,14,14,16]
```



```
start x during ->
Allen* relations : 6 elts
during (6 elts) Min = [2,2,6,6] Max = [10,10,14,14]
Allen* Min = during [2,2,6,6] , Max = during [10,10,14,14]
Allen*-------------
start x contains ->
Allen* relations : 888 elts
finished_by (30 elts) Min = [0,3,4,7]
Min = [0,3,4,7] Max = [8,11,12,15]
meets (3\overline{4} elts)
Min = [0,1,4,5][0,1,2,5] Max = [8,9,12,13]
Min = [0,2,4,6][0,2,2,6] Max = [8,10,12,14]
Min = [0,4,4,8] Max = [8,12,12,16]
overlaps (34 elts)
contains (56 elts)
Allen* Min = meets [0,1,4,5] [0,1,2,5], Max = contains [8,12,12,16]
Allen* Min = meet
start x subset ->
```

Allen* relations : 6 elts
start (6 elts) $\quad \operatorname{Min}=[1,2,5,6] \quad \operatorname{Max}=[9,10,13,14]$
Allen* Min $=$ start $[1,2,5,6]$, Max $=\operatorname{start}[9,10,13,14]$
started_by x precedes ->
Allen* relations : 17 elts
precedes (1 elts)
$\operatorname{Min}=[0,0,0,0]$
$\operatorname{Max}=[0,0,0,0]$
Allen* Min $=$ precedes $[0,0,0,0]$, Max $=$ precedes $[0,0,0,0]$
started_by x preceded_by ->
Allen* relations : 1 elts
preceded_by (1 elts) $\quad \operatorname{Min}=[16,16,16,16] \quad \operatorname{Max}=[16,16,16,16]$
Allen* Min $=$ preceded_by $[16,16,16,16]$, Max $=$ preceded_by $[16,16,16,16]$
started_by x start ->
Allen* relations : 166 elts
start (6 elts)
started_by (54 elts)
finished_by (1 elts)
meets (1 elts)
overlaps (1 elts)
contains (1 elts)
subset ( 6 elts)
Allen* Min $=$ start $[1,2,5,6]$, Max $=$ started_by $[9,12,13,16]$
$\operatorname{Min}=[1,2,5,6]$
$\operatorname{Min}=[1,4,5,8]$
Min $=[1,7,9,15][0,3,4,7]$
Min $=[1,5,9,13][0,1,2,5]$
Min $=[1,6,9,14][0,2,2,6]$
$\operatorname{Min}=[1,8,9,16][0,4,4,8]$
Min $=[1,3,5,7]$

Max $=[9,10,13,14]$
$\operatorname{Max}=[9,12,13,16]$
Max $=[1,7,9,15][8,11,12,15]$
Max $=[1,5,9,13][8,9,12,13]$
Max $=[1,6,9,14][8,10,12,14]$
Max $=[1,8,9,16][8,12,12,16]$
Max $=[9,11,13,15]$
started_by x started_by ->
Allen* relations : 54 elts
started_by (54 elts) $\quad \operatorname{Min}=[1,4,5,8] \quad \operatorname{Max}=[9,12,13,16]$
finished_by (1 elts) $\quad \operatorname{Min}=[1,7,9,15][0,3,4,7]$
meets (1 elts)
Min $=[1,5,9,13][0,1,2,5]$
$\operatorname{Max}=[1,7,9,15][8,11,12,15]$
overlaps (1 elts) $\quad$ Min $=[1,6,9,14][0,2,2,6]$
Max $=[1,5,9,13][8,9,12,13]$

Allen* Min $=$ started_by $[1,4,5,8]$, Max $=$ started_by $[9,12,13,16]$
started by x finishes ->
Allen* relations : 98 elts
finished_by (1 elts) $\quad \operatorname{Min}=[2,7,10,15][0,3,4,7]$
meets ( 5 elts) $\quad$ Min $=[2,5,6,9][0,1,2,5]$
overlaps (5 elts)
$\operatorname{Min}=[2,6,6,10][0,2,2,6]$
Max $=[2,7,10,15][8,11,12,15]$

Min $=[2,4,6,8]$
$[6,9,10,13][8,9,12,13]$
overlapped_by (98 elts)
Min $=[2,8,10,16][0,4,4,8]$
$\operatorname{Max}=[10,14,14,16]$
contains (3 elts)
Max $=[2,10,10,16][8,12,12,16]$
Allen* Min $=$ overlapped_by $[2,4,6,8]$, Max $=$ overlapped_by $[10,14,14,16]$
started_by x finished_by ->
Allen* $\overline{r e l a t i o n s ~: ~} 14 \overline{8}$ elts
finished_by (1 elts)
meets ( $3^{-}$elts)
overlaps (3 elts)
contains (148 elts)
$\begin{array}{ll}\text { contains (148 elts) } & \text { Min }=[0,4,4,8] \\ \text { Allen* Min }=\text { contains }[0,4,4,8], ~ M a x ~=~ c o n t a i n ~\end{array}$

Min $=[0,7,8,15][0,3,4,7]$
$\operatorname{Min}=[0,5,6,13][0,1,2,5]$
$\operatorname{Min}=[0,6,6,14][0,2,2,6]$

Max $=[0,7,8,15][8,11,12,15]$
$\operatorname{Max}=[0,5,8,13][8,9,12,13]$
Max $=[0,6,8,14][8,10,12,14]$
$\operatorname{Max}=[8,12,12,16]$
started by x meets ->
Allen* relations : 734 elts
finished_by (53 elts)
meets (3 elts)
met_by (25 elts)
overlaps (97 elts)
overlapped_by (25 elts)
contains (168 elts)

Min $=[0,3,4,7]$
Min $=[0,5,6,13][0,1,2,5]$
$\operatorname{Min}=[3,6,7,10][3,4,7,8]$
Min $=[0,2,2,6]$
$\operatorname{Min}=[2,6,6,10][2,4,6,8]$
Min $=[0,4,4,8]$
$\operatorname{Max}=[8,11,12,15]$
$\operatorname{Max}=[0,5,8,13][8,9,12,13]$
$\operatorname{Max}=[7,10,11,16][11,14,15,16]$
$\operatorname{Max}=[8,10,12,14]$
$\operatorname{Max}=[6,10,10,16][10,14,14,16]$
$\operatorname{Max}=[8,12,12,16]$

Allen* Min $=$ overlaps $[0,2,2,6], \operatorname{Max}=$ contains $[8,12,12,16]$
started_by x met_by ->
Allen* relations : 98 elts
finished_by (1 elts) $\quad$ Min $=[3,7,11,15][0,3,4,7]$
meets ( 5 elts)
met_by (98 elts)
overlaps (5 elts)
$\operatorname{Min}=[3,5,7,9][0,1,2,5]$
$\operatorname{Min}=[3,4,7,8]$
Min $=[3,6,7,10][0,2,2,6]$
$\operatorname{Max}=[3,7,11,15][8,11,12,15]$
Max $=[7,9,11,13][8,9,12,13]$
Max $=[11,14,15,16]$
$\operatorname{Max}=[7,10,11,14][8,10,12,14]$
contains (3 elts) Min = [3,8,11,16] [0,4,4,8] Max = [3,10,11,16] [8,12,12,16]

Allen* Min $=$ met_by $[3,4,7,8], \operatorname{Max}=\operatorname{met}$ by $[11,14,15,16]$
started_by x overlaps ->
Allen* relations : 734 elts
finished by (53 elts)
meets (3 elts)
met_by (25 elts)
Min $=[0,3,4,7]$
$\operatorname{Min}=[0,5,6,13][0,1,2,5]$
Min $=[3,6,7,10][3,4,7,8]$
Max $=[8,11,12,15]$
$\operatorname{Min}=[0,2,2,6]$
Max $=[0,5,8,13][8,9,12,13]$
overlaps (97 elts)
$\operatorname{Min}=[2,6,6,10][2,4,6,8$
Max $=[7,10,11,16][11,14,15,16]$
overlapped_by (25 elts)
contains (168 elts) $\quad \operatorname{Min}=[0,4,4,8] \quad \operatorname{Max}=[8,12,12,16]$
$\operatorname{Max}=[8,10,12,14]$

Allen* Min $=$ overlaps $[0,2,2,6]$, Max $=$ contains $[8,12,12,16]$
started_by x overlapped_by ->
Allen* relations : 98 elts
finished_by (1 elts) $\quad \operatorname{Min}=[2,7,10,15][0,3,4,7] \quad \operatorname{Max}=[2,7,10,15][8,11,12,15]$
meets (5 elts) $\quad$ Min $=[2,5,6,9][0,1,2,5]$
overlaps (5 elts) $\quad \operatorname{Min}=[2,6,6,10][0,2,2,6]$
Min $=[2,4,6,8]$
Max $=[6,9,10,13][8,9,12,13]$
overlapped_by (98 elts)
Max $=[6,10,10,14][8,10,12,14]$
contains (3 elts)
Min $=[2,8,10,16][0,4,4,8] \quad$ Max $=[10,14,14,16]$
Allen* Min = overlapped_by $[2,4,6,8]$, Max = overlapped_by $[10,14,14,16]$
Max $=[2,10,10,16][8,12,12,16]$
started_by x during ->
Allen* relations : 234 elts
finishes (6 elts)
Min $=[2,3,6,7]$
Max = [10,11,14,15]
finished_by (1 elts)
Min $=[2,7,10,15][0,3,4,7]$
$\operatorname{Max}=[2,7,10,15][8,11,12,15]$
meets (5 elts)
Min $=[2,5,6,9][0,1,2,5]$
Max $=[6,9,10,13][8,9,12,13]$
overlaps (5 elts)
$\operatorname{Min}=[2,6,6,10][0,2,2,6]$
$\operatorname{Max}=[6,10,10,14][8,10,12,14]$
overlapped_by (98 elts)
during (6 elts)
$\operatorname{Min}=[2,4,6,8]$
Max $=[10,14,14,16]$
Min $=[2,2,6,6]$
Max $=[10,10,14,14]$
contains (3 elts)
Min $=[2,8,10,16][0,4,4,8] \quad \operatorname{Max}=[2,10,10,16][8,12,12,16]$
Allen* Min $=$ during $[2,2,6,6]$, Max $=$ overlapped_by [10,14,14,16]
started_by x contains ->
Allen* relations : 148 elts
finished_by (1 elts) $\quad \operatorname{Min}=[0,7,8,15][0,3,4,7] \quad \operatorname{Max}=[0,7,8,15][8,11,12,15]$
meets (3 elts) $\quad \operatorname{Min}=[0,5,6,13][0,1,2,5] \quad \operatorname{Max}=[0,5,8,13][8,9,12,13]$
overlaps (3 elts) $\quad \operatorname{Min}=[0,6,6,14][0,2,2,6] \quad \operatorname{Max}=[0,6,8,14][8,10,12,14]$
contains (148 elts) Min = [0,4,4,8] Max = [8,12,12,16]
Allen* Min $=$ contains $[0,4,4,8]$, Max $=$ contains $[8,12,12,16]$
started by x subset ->
Allen* $\bar{r} e l a t i o n s ~: ~ 54 ~ e l t s ~$
started by (54 elts) Min $=[1,4,5,8] \quad$ Max $=[9,12,13,16]$
finished_by (1 elts) $\quad \operatorname{Min}=[1,7,9,15][0,3,4,7]$
meets (1 elts) $\quad \operatorname{Min}=[1,5,9,13][0,1,2,5]$
overlaps (1 elts) $\quad$ Min $=[1,6,9,14][0,2,2,6]$
Max $=[1,7,9,15][8,11,12,15]$
overlaps (1 elts) Min $=[1,6,9,14][0,2,2,6] \quad$ Max $=[1,6,9,14][8,10,12,14]$
contains (1 elts) $\quad \operatorname{Min}=[1,8,9,16][0,4,4,8] \quad \operatorname{Max}=[1,8,9,16][8,12,12,16]$
Allen* Min = started_by $[1,4,5,8]$, Max $=$ started_by $[9,12,13,16]$
finishes x precedes ->
Allen* relations : 1 elts
precedes (1 elts) $\quad \operatorname{Min}=[0,0,0,0] \quad \operatorname{Max}=[0,0,0,0]$
Allen* Min $=$ precedes $[0,0,0,0]$, Max $=$ precedes $[0,0,0,0]$
finishes x preceded_by ->
Allen* relations : $\overline{1}$ elts
preceded_by (1 elts) Min = [16,16,16,16] Max $=[16,16,16,16]$
Allen* Min $=$ preceded_by $[16,16,16,16]$, Max $=$ preceded_by $[16,16,16,16]$
finishes x start ->
Allen* relations : 6 elts
during (6 elts) $\quad \operatorname{Min}=[2,2,6,6] \quad$ Max $=[10,10,14,14]$
Allen* Min $=$ during $[2,2,6,6]$, Max $=$ during [10,10,14,14]
finishes x started_by ->
Allen* relations : 360 elts

```
met by (30 elts) Min = [3,4,7,8] Max = [11,12,15,16][11,14,15,16]
ove\overline{rlapped_by (30 elts) Min = [2,4,6,8] Max = [10,12,14,16][10,14,14,16]}
Allen* Min = overlapped_by [2,4,6,8] , Max = met_by [11,12,15,16] [11,14,15,16]
finishes x finishes ->
Allen* relations : 6 elts
finishes (6 elts) Min = [2,3,6,7] Max = [10,11,14,15]
Allen* Min = finishes [2,3,6,7] , Max = finishes [10,11,14,15]
finishes x finished_by ->
Allen* relations : 126 elts
finishes (6 elts) Min = [2,3,6,7] Max = [10,11,14,15
finished_by (30 elts) Min = [0,3,4,7] Max = [8,11,12,15]
subset (\overline{6 elts) Min = [1,3,5,7] Max = [9,11,13,15]}
Allen* Min = finished by [0,3,4,7] , Max = finishes [10,11,14,15]
finishes x meets ->
Allen* relations : 80 elts
meets (80 elts) Min = [0,1,2,5] Max = [8,9,12,13]
met by (5 elts) Min = [3,5,7,9][3,4,7,8] Max = [7,9,11,13][11,14,15,16]
ove\overline{l}lapped_by (5 elts) Min = [2,5,6,9][2,4,6,8] Max = [6,9,10,13][10,14,14,16]
Allen* Min = meets [0,1,2,5] , Max = meets [8,9,12,13]
finishes x met_by ->
Allen* relations : 340 elts
start (3 elts) Min = [5,6,9,10][1,2,5,6] Max = [9,10,13,14]
meets (11 elts) Min = [4,5,8,9][0,1,2,5] Max = [8,9,12,13]
overlaps (11 elts) Min = [4,6,8,10][0,2,2,6] Max = [8,10,12,14]
during (3 elts) Min = [6,6,10,10][2,2,6,6] Max = [10,10,14,14]
Allen* Min = meets [4,5,8,9] [0,1,2,5], Max = during [10,10,14,14]
finishes x overlaps ->
Allen* relations : 204 elts
start (6 elts) Min = [1,2,5,6]
met by (5 elts) Min = [3,6,7,10][3,4,7,8]
Max = [7,10,11,14]
overlaps (80 elts)
Min = [0,2,2,6] Max = [8,10,12,14]
overlapped by (5 elts) Min = [2,6,6,10][2,4,6,8]
Max = [6,10,10,14][10,14,14,16]
during (6 \overline{elts) Min = [2,2,6,6] Max = [10,10,14,14]}
Allen* Min = overlaps [0,2,2,6] , Max = during [10,10,14,14]
---------------
finishes x overlapped_by ->
Allen* relations : 1136 elts
start (3 elts) Min = [5,6,9,10][1,2,5,6] Max = [9,10,13,14]
meets (51 elts) Min = [2,5,6,9][0,1,2,5] Max = [8,9,12,13]
met_by (80 elts) Min = [3,4,7,8] Max = [11,14,15,16
overlaps (51 elts)
    Min = [2,6,6,10][0,2,2,6] Max = [8,10,12,14]
    Min = [2,6,6,10][0,2,2,6] Max = [8,10,12,14]
overlapped by (80 elts)
Max = [10,14,14,16]
during (3 elts) Min = [6,6,10,10][2,2,6,6] Max = [10,10,14,14]
Allen* Min = overlapped_by [2,4,6,8] , Max = met_by [11,14,15,16]
finishes x during ->
Allen* relations : 6 elts
during (6 elts) Min = [2,2,6,6] Max = [10,10,14,14]
Allen* Min = during [2,2,6,6] , Max = during [10,10,14,14]
finishes x contains ->
Allen* relations : 888 elts
started_by (30 elts) Min = [1,4,5,8] Max = [9,12,13,16]
met by (34 elts) Min = [3,4,7,8] Max = [11,12,15,16][11,14,15,16]
overlapped_by (34 elts) Min = [2,4,6,8] Max = [10,12,14,16][10,14,14,16]
contains (56 elts) Min = [0,4,4,8] Max = [8,12,12,16]
Allen* Min = contains [0,4,4,8] , Max = met_by [11,12,15,16] [11,14,15,16]
finishes x subset ->
Allen* relations : 6 elts
finishes (6 elts) Min = [2,3,6,7] Max = [10,11,14,15]
Allen* Min = finishes [2,3,6,7] , Max = finishes [10,11,14,15]
```

finished_by x precedes ->
Allen* relations : 1 elts
$\begin{array}{ll}\text { precedes (1 elts) } & \text { Min }=[0,0,0,0] \\ \text { Allen* Min }=\text { precedes }[0,0,0,0], \text { Max }=\text { precedes }[0,0,0,0]\end{array}$
finished_by x preceded_by ->
Allen* relations : 17 elts
preceded_by (1 elts) Min $=[16,16,16,16] \quad$ Max $=[16,16,16,16]$
Allen* Min = preceded_by $[16,16,16,16]$, Max $=$ preceded_by $[16,16,16,16]$
finished_by x start ->
Allen* relations : 98 elts
started_by (1 elts) $\quad \operatorname{Min}=[1,6,9,14][1,4,5,8] \quad \operatorname{Max}=[1,6,9,14][9,12,13,16]$
met_by (5 elts) $\quad \operatorname{Min}=[3,6,7,10][3,4,7,8] \quad \operatorname{Max}=[7,10,11,14][11,14,15,16]$
overlaps (98 elts)
overlapped_by (5 elts)
contains (3 elts)
Min $=[0,2,2,6]$
$\operatorname{Min}=[2,6,6,10][2,4,6,8] \quad \operatorname{Max}=[6,10,10,14][10,14,14,16]$
$\operatorname{Min}=[0,6,6,14][0,4,4,8] \quad \operatorname{Max}=[0,6,8,14][8,12,12,16]$
Allen* Min $=$ overlaps $[0,2,2,6]$, Max $=$ overlaps $[8,10,12,14]$
finished_by x started_by ->
Allen* relations : 148 elts
started by (1 elts) Min = [1,8,9,16][1,4,5,8]
met_by (3 elts)
overlapped_by (3 elts)
apped_by (3 elts) $\quad \operatorname{Min}=[2,8,10,16][2,4,6,8]$
contains (148 elts)

Min $=[3,8,11,16][3,4,7,8]$
$\operatorname{Min}=[0,4,4,8]$

Max $=[1,8,9,16][9,12,13,16]$
$\operatorname{Max}=[3,10,11,16][11,14,15,16]$
Max $=[2,10,10,16][10,14,14,16]$
$\operatorname{Max}=[8,12,12,16]$

Allen* Min $=$ contains $[0,4,4,8]$, Max $=$ contains $[8,12,12,16]$
finished_by x finishes ->
Allen* relations : 166 elts
started_by (1 elts)
finishes (6 elts)

Min $=[1,7,9,15][1,4,5,8]$
$\operatorname{Min}=[2,3,6,7]$
$\operatorname{Min}=[0,3,4,7]$
$\operatorname{Min}=[3,7,11,15][3,4,7,8]$
$\operatorname{Min}=[2,7,10,15][2,4,6,8]$
$\operatorname{Min}=[0,7,8,15][0,4,4,8]$
Min $=[1,3,5,7]$

Max $=[1,7,9,15][9,12,13,16]$
Max $=[10,11,14,15]$
Max $=[8,11,12,15]$
Max $=[3,7,11,15][11,14,15,16]$
Max $=[2,7,10,15][10,14,14,16]$
$\operatorname{Max}=[0,7,8,15][8,12,12,16]$
Max $=[9,11,13,15]$
subset (6 elts)
$[10,11,14,15]$
Allen* Min = fini
finished_by x finished_by ->
Allen* relations : 54 elts
started by (1 elts) $\quad \operatorname{Min}=[1,7,9,15][1,4,5,8] \quad \operatorname{Max}=[1,7,9,15][9,12,13,16]$
finished_by (54 elts)
Min $=[0,3,4,7] \quad$ Max $=[8,11,12,15]$
$\operatorname{Min}=[3,7,11,15][3,4,7,8] \quad \operatorname{Max}=[3,7,11,15][11,14,15,16]$
met_by (1 elts)
overlapped by (1 elts)
$\operatorname{Min}=[2,7,10,15][2,4,6,8] \quad \operatorname{Max}=[2,7,10,15][10,14,14,16]$
contains (1 elts)
$\operatorname{Min}=[0,7,8,15][0,4,4,8]$
Max $=[0,7,8,15][8,12,12,16]$
Allen* Min $=$ finished_by $[0,3,4,7]$, Max $=$ finished_by $[8,11,12,15]$
finished_by x meets ->
Allen* rēlations : 98 elts
started_by (1 elts) $\quad \operatorname{Min}=[1,5,9,13][1,4,5,8]$
Min $=[0,1,2,5]$
Min $=[3,5,7,9][3,4,7,8]$
Max $=[1,5,9,13][9,12,13,16]$
meets (98 elts)
Max $=[8,9,12,13]$
met_by (5 elts)
overlapped_by (5 elts)
in $=[2,5,6,9][2,4,6,8]$
Max $=[7,9,11,13][11,14,15,16]$
$\operatorname{Min}=[0,5,6,13][0,4,4,8]$
Max $=[6,9,10,13][10,14,14,16]$
contains (3 elts)
Allen* Min $=$ meets $[0,1,2,5], \operatorname{Max}=\operatorname{meets}[8,9,12,13]$
$\operatorname{Max}=[0,5,8,13][8,12,12,16]$
finished_by x met_by ->
Allen* relations : 734 elts
started_by (53 elts)
meets (25 elts)
$\operatorname{Min}=[1,4,5,8] \quad$ Max $=[9,12,13,16]$
Min $=[0,5,6,9][0,1,2,5]$
Max $=[6,9,10,13][8,9,12,13]$
met_by (3 elts) $\quad \operatorname{Min}=[3,8,11,16][3,4,7,8]$
Max $=[3,10,11,16][11,14,15,16]$
overlaps (25 elts)
$\operatorname{Min}=[0,6,6,10][0,2,2,6]$
Max $=[6,10,10,14][8,10,12,14]$
overlapped_by (97 elts)
$\operatorname{Min}=[2,4,6,8]$
Max $=[10,14,14,16]$
contains (168 elts) $\quad$ Min $=[0,4,4,8] \quad$ Max $=[8,12,12,16]$
Allen* Min $=$ contains $[0,4,4,8]$, Max $=$ overlapped_by [10,14,14,16]
finished_by x overlaps ->
Allen* relations : 98 elts
started_by (1 elts)
met_by (5 elts)
overlaps (98 elts)
overlapped_by (5 elts)
contains (3 elts)
Allen* Min $=$ overlaps $[0,2,2,6]$, Max $=$ overlaps $[8,10,12,14]$
----------------
finished_by x overlapped_by ->
Allen* relations : 734 elts
started_by (53 elts)
meets (25 elts)
met_by (3 elts)
overlaps (25 elts)
overlapped_by (97 elts)
contains (168 elts)

| $\operatorname{Min}=[1,6,9,14][1,4,5,8]$ | Max $=[1,6,9,14][9,12,13,16]$ |
| :--- | :--- |
| $\operatorname{Min}=[3,6,7,10][3,4,7,8]$ | $\operatorname{Max}=[7,10,11,14][11,14,15,16]$ |
| $\operatorname{Min}=[0,2,2,6]$ | Max $=[8,10,12,14]$ |
| $\operatorname{Min}=[2,6,6,10][2,4,6,8]$ | $\operatorname{Max}=[6,10,10,14][10,14,14,16]$ |
| $\operatorname{Min}=[0,6,6,14][0,4,4,8]$ | Max $=[0,6,8,14][8,12,12,16]$ |

$\operatorname{Min}=[1,6,9,14][1,4,5,8] \quad \operatorname{Max}=[1,6,9,14][9,12,13,16]$
$\operatorname{Min}=[3,6,7,10][3,4,7,8] \quad \operatorname{Max}=[7,10,11,14][11,14,15,16]$
$\operatorname{Min}=[0,2,2,6]$
$\operatorname{Max}=[8,10,12,14]$
$\operatorname{Max}=[6,10,10,14][10,14,14,16]$
$\operatorname{Max}=[0,6,8,14][8,12,12,16]$
Min $=[0,4,4,8] \quad$ Max $=[8,12,12,16]$
----------------
finished_by x during ->
Allen* relations : 234 elts
start (6 elts)
started_by (1 elts)
met_by (5 elts)
overlaps (98 elts)
overlapped_by (5 elts)
during ( 6 elts)
contains (3 elts)
Allen* Min $=$ overlaps $[0,2,2,6]$, Max $=$ during $[10,10,14,14]$
finished_by x contains ->
Allen* relations : 148 elts
started_by (1 elts) $\quad \operatorname{Min}=[1,8,9,16][1,4,5,8] \quad \operatorname{Max}=[1,8,9,16][9,12,13,16]$
met_by $(3$ elts $) \quad \operatorname{Min}=[3,8,11,16][3,4,7,8] \quad \operatorname{Max}=[3,10,11,16][11,14,15,16]$
overlapped_by (3 elts) $\quad \operatorname{Min}=[2,8,10,16][2,4,6,8] \quad \operatorname{Max}=[2,10,10,16][10,14,14,16]$
contains (148 elts) $\quad \operatorname{Min}=[0,4,4,8] \quad \operatorname{Max}=[8,12,12,16]$
Allen* Min $=$ contains $[0,4,4,8]$, Max $=$ contains $[8,12,12,16]$
finished_by x subset ->
Allen* relations : 54 elts
started_by (1 elts)
finished_by (54 elts)
met_by ( $\overline{1}$ elts)
Min $=[3,7,11,15][3,4,7,8]$
$\operatorname{Min}=[2,7,10,15][2,4,6,8]$
Min $=[0,7,8,15][0,4,4,8]$
$\operatorname{Max}=[1,7,9,15][9,12,13,16]$
contains ( $\overline{1}$ elts)
Allen* Min $=$ finished_by $[0,3,4,7]$, Max $=$ finished_by $[8,11,12,15]$
meets x precedes ->
Allen* relations : 1 elts
precedes (1 elts) $\quad \operatorname{Min}=[0,0,0,0] \quad \operatorname{Max}=[0,0,0,0]$
Allen* Min $=$ precedes $[0,0,0,0], \operatorname{Max}=\operatorname{precedes}[0,0,0,0]$
meets x preceded_by ->
Allen* relations : 17 elts
preceded_by (1 elts) Min = [16,16,16,16] Max $=[16,16,16,16]$
Allen* Min = preceded_by $[16,16,16,16]$, Max $=$ preceded_by $[16,16,16,16]$
meets x start ->
Allen* relations : 98 elts
started_by (1 elts)
meets ( 98 elts)
met_by (5 elts)
overlapped_by (5 elts)
contains (3 elts)
$\operatorname{Min}=[1,5,9,13][1,4,5,8]$
$\operatorname{Min}=[0,1,2,5]$
$\operatorname{Min}=[3,5,7,9][3,4,7,8] \quad \operatorname{Max}=[7,9,11,13][11,14,15,16]$
$\operatorname{Min}=[2,5,6,9][2,4,6,8] \quad \operatorname{Max}=[6,9,10,13][10,14,14,16]$
$\operatorname{Min}=[0,5,6,13][0,4,4,8] \quad \operatorname{Max}=[0,5,8,13][8,12,12,16]$
$\operatorname{Max}=[1,5,9,13][9,12,13,16]$
$\operatorname{Max}=[8,9,12,13]$
$\operatorname{Max}=[6,9,10,13][10,14,14,16]$
$\operatorname{Max}=[0,5,8,13][8,12,12,16]$
Allen* Min $=$ meets $[0,1,2,5], \operatorname{Max}=\operatorname{meets}[8,9,12,13]$
meets x started_by ->

Allen* relations : 98 elts
started_by (1 elts)
meets (98 elts)
met_by ( 5 elts)
overlapped_by (5 elts)
contains ( $\overline{3}$ elts)
Allen* Min
----------------
meets x finishes ->
Allen* relations : 234 elts
start ( 6 elts)
started_by (1 elts)
met_by (5 elts)
overlaps (98 elts)
overlapped_by (5 elts)
during ( 6 elts)
contains ( 3 elts)
$\operatorname{Min}=[1,5,9,13][1,4,5,8]$
$\operatorname{Min}=[0,1,2,5]$
Min $=[3,5,7,9][3,4,7,8]$
$\operatorname{Min}=[2,5,6,9][2,4,6,8]$
Min $=[0,5,6,13][0,4,4,8]$
Max $=$ meets $[8,9,12,13]$

Max $=[1,5,9,13][9,12,13,16]$
Max $=[8,9,12,13]$
$\operatorname{Max}=[7,9,11,13][11,14,15,16]$
$\operatorname{Max}=[6,9,10,13][10,14,14,16]$
Max $=[0,5,8,13][8,12,12,16]$

Allen* Min $=$ overlaps $[0,2,2,6]$, Max $=$ during $[10,10,14,14]$
meets x finished_by ->
Allen* relations : 520 elts
started_by (11 elts)
met_by (13 elts)
overlapped_by (13 elts)
Allen* Min $=$ contains $[0,4,4,8]$, Max $=$ met_by $[7,8,11,12]$
----------------
meets x meets ->
Allen* relations : 980 elts
start (3 elts)
started_by (11 elts)
finishes (3 elts)
finished_by (11 elts)
met_by (17 elts)
overlaps (25 elts)
overlapped_by (17 elts)
during (3 elts)
contains (21 elts)
Min $=[0,4,4,8]$
Allen* Min $=$ overlaps $[0,2,2,6]$, Max $=$ met_by $[7,8,11,12]$
$\operatorname{Min}=[1,2,5,6]$
$\operatorname{Min}=[1,4,5,8]$
$\operatorname{Min}=[2,3,6,7]$
Min $=[0,3,4,7]$
$\operatorname{Min}=[3,4,7,8]$
$\operatorname{Min}=[0,2,2,6]$
$\operatorname{Min}=[2,4,6,8]$
$\operatorname{Min}=[2,2,6,6]$
$\operatorname{Min}=[1,3,5,7]$
meets x met_by ->
Allen* relations : 166 elts
started_by (1 elts)
finishes (6 elts)
finished_by (54 elts)
met_by ( $\overline{1}$ elts)
overlapped_by (1 elts)
contains (1 elts)
subset ( 6 elts)
$\operatorname{Min}=[1,7,9,15][1,4,5,8]$
$\operatorname{Min}=[2,3,6,7]$
$\operatorname{Min}=[0,3,4,7]$
Min $=[3,7,11,15][3,4,7,8]$
Min $=[2,7,10,15][2,4,6,8]$
$\operatorname{Min}=[0,7,8,15][0,4,4,8]$
Min $=[1,3,5,7]$

Max $=[5,6,9,10][9,10,13,14]$
$\operatorname{Max}=[5,8,9,12][9,12,13,16]$
Max $=[6,7,10,11][10,11,14,15]$
Max $=[4,7,8,11][8,11,12,15]$
$\operatorname{Max}=[7,8,11,12][11,14,15,16]$
$\operatorname{Max}=[4,6,8,10][8,10,12,14]$
$\operatorname{Max}=[6,8,10,12][10,14,14,16]$
$\operatorname{Max}=[6,6,10,10][10,10,14,14]$
$\operatorname{Max}=[4,8,8,12][8,12,12,16]$
Max $=[5,7,9,11][9,11,13,15]$
$[11,14,15,16]$

Allen* Min $=$ finished_by $[0,3,4,7]$, $\operatorname{Max}=$ finishes $[10,11,14,15]$
meets x overlaps ->
Allen* relations : 980 elts
start (3 elts) $\quad$ Min $=[1,2,5,6]$
Max $=[1,7,9,15][9,12,13,16]$
Max $=[10,11,14,15]$
$\operatorname{Max}=[8,11,12,15]$
$\operatorname{Max}=[3,7,11,15][11,14,15,16]$
$\operatorname{Max}=[2,7,10,15][10,14,14,16]$
$\operatorname{Max}=[0,7,8,15][8,12,12,16]$
$\operatorname{Max}=[9,11,13,15]$
$\operatorname{Max}=[9,10,13,14]$
Max $=[1,6,9,14][9,12,13,16]$
$\operatorname{Max}=[7,10,11,14][11,14,15,16]$
$\operatorname{Max}=[8,10,12,14]$
$\operatorname{Max}=[6,10,10,14][10,14,14,16]$
$\operatorname{Max}=[10,10,14,14]$
$\operatorname{Max}=[0,6,8,14][8,12,12,16]$

| Min $=[1,2,5,6]$ | Max $=[9,10,13,14]$ |
| :--- | :--- |
| Min $=[1,6,9,14][1,4,5,8]$ | Max $=[1,6,9,14][9,12,13,16]$ |
| Min $=[3,6,7,10][3,4,7,8]$ | Max $=[7,10,11,14][11,14,15,16$ |
| Min $=[0,2,2,6]$ | Max $=[8,10,12,14]$ |
| Min $=[2,6,6,10][2,4,6,8]$ | Max $=[6,10,10,14][10,14,14,16$ |
| Min $=[2,2,6,6]$ | Max $=[10,10,14,14]$ |
| Min $=[0,6,6,14][0,4,4,8]$ | Max $=[0,6,8,14][8,12,12,16]$ |

Min $=[1,4,5,8]$
Max $=[5,8,9,12][9,12,13,16]$
$\operatorname{Max}=[7,8,11,12][11,14,15,16]$
$\operatorname{Max}=[6,8,10,12][10,14,14,16]$
Max $=[4,8,8,12][8,12,12,16]$
$[11,14,15,16]$
started_by (11 elts)
$\operatorname{Min}=[1,4,5,8]$
$\operatorname{Max}=[5,6,9,10][9,10,13,14]$
finishes (3 elts) $\quad$ Min $=[2,3,6,7]$
finished_by (11 elts)
met_by (17 elts)
$\operatorname{Min}=[0,3,4,7]$
Min $=[3,4,7,8]$
overlaps (25 elts)
overlapped_by (17 elts)
$\operatorname{Min}=[0,2,2,6]$

Min $=[2,2,6,6]$
contains (21 elts) $\quad$ Min $=[0,4,4,8]$
Max $=[5,8,9,12][9,12,13,16]$
$\operatorname{Max}=[6,7,10,11][10,11,14,15]$
$\operatorname{Max}=[4,7,8,11][8,11,12,15]$
$\operatorname{Max}=[7,8,11,12][11,14,15,16]$
$\operatorname{Max}=[4,6,8,10][8,10,12,14]$
$\operatorname{Max}=[6,8,10,12][10,14,14,16]$
$\operatorname{Max}=[6,6,10,10][10,10,14,14]$
subset (3 elts) $\quad$ Min $=[1,3,5,7]$
$\operatorname{Max}=[4,8,8,12][8,12,12,16]$
Allen* Min $=$ overlaps $[0,2,2,6], \operatorname{Max}=\operatorname{met}$ by $[7,8,11,12][11,14,15,16]$
meets x overlapped_by ->

Allen* relations : 234 elts
start (6 elts)
started_by (1 elts)
met_by (5 elts)
overlaps (98 elts)
overlapped_by (5 elts)
during ( 6 elts)
contains (3 elts)
contains (3 elts) $\quad$ Min $=[0,6,6,14][0,4,4,8]$
Allen* Min $=$ overlaps $[0,2,2,6]$, Max $=$ during $[10,10,14,14]$
meets x during ->
Allen* relations : 234 elts
start (6 elts)
started_by (1 elts)
met_by (5 elts)
overlaps (98 elts)
overlapped_by (5 elts)
during (6 elts)
contains (3 elts) $\quad \operatorname{Min}=[0,6,6,14][0,4,4,8] \quad \operatorname{Max}=[0,6,8,14][8,12,12,16]$
Allen* Min $=$ overlaps $[0,2,2,6]$, Max $=$ during [10,10,14,14]
meets x contains ->
Allen* relations : 520 elts
started_by (11 elts)
met_by (13 elts)
overlapped_by (13 elts) $\quad \operatorname{Min}=[2,4,6,8] \quad$ Max $=[6,8,10,12][10,14,14,16]$
contains (21 elts) $\quad \operatorname{Min}=[0,4,4,8] \quad \operatorname{Max}=[4,8,8,12][8,12,12,16]$
Allen* Min $=$ contains $[0,4,4,8], \operatorname{Max}=\operatorname{met}$ _by $[7,8,11,12][11,14,15,16]$
meets x subset ->
Allen* relations : 98 elts
started_by (1 elts) $\quad \operatorname{Min}=[1,5,9,13][1,4,5,8]$
Min $=[1,5,9,13][1,4,5,8]$
Min $=[0,1,2,5]$
Max $=[1,5,9,13][9,12,13,16]$
meets ( 98 elts)
Min $=[3,5,7,9][3,4,7,8]$
Max $=[8,9,12,13]$
met_by (5 elts)
$\operatorname{Min}=[2,5,6,9][2,4,6,8]$
Max $=[7,9,11,13][11,14,15,16]$
overlapped_by (5 elts)
contains (3 elts)
$\operatorname{Min}=[0,5,6,13][0,4,4,8]$
$\operatorname{Max}=[6,9,10,13][10,14,14,16]$

Allen* Min $=$ meets $[0,1,2,5], \operatorname{Max}=\operatorname{meets}[8,9,12,13]$
met_by x precedes ->
Allen* relations : 17 elts
precedes (1 elts) $\quad \operatorname{Min}=[0,0,0,0] \quad \operatorname{Max}=[0,0,0,0]$
Allen* Min $=$ precedes $[0,0,0,0], \operatorname{Max}=\operatorname{precedes}[0,0,0,0]$
met_by x preceded_by ->
Allen* relations $\overline{\text { : }} 1$ elts
preceded_by (1 elts) $\quad$ Min $=[16,16,16,16] \quad$ Max $=[16,16,16,16]$
Allen* Mīn $=$ preceded_by $[16,16,16,16]$, Max $=$ preceded_by $[16,16,16,16]$
met by x start ->
Allēn* relations : 234 elts
finishes (6 elts)
finished_by (1 elts)
meets ( 5 elts)
overlaps (5 elts)
overlapped_by (98 elts)
during ( 6 elts)
contains (3 elts)
Min $=[2,8,10,16][0,4,4,8]$

| Min $=[2,3,6,7]$ | Max $=[10,11,14,15]$ |
| :--- | :--- |
| Min $=[2,7,10,15][0,3,4,7]$ | Max $=[2,7,10,15][8,11,12,15]$ |
| Min $=[2,5,6,9][0,1,2,5]$ | Max $=[6,9,10,13][8,9,12,13]$ |
| Min $=[2,6,6,10][0,2,2,6]$ | Max $=[6,10,10,14][8,10,12,14]$ |
| $\operatorname{Min}=[2,4,6,8]$ | Max $=[10,14,14,16]$ |
| $\operatorname{Min}=[2,2,6,6]$ | Max $=[10,10,14,14]$ |
| Min $=[2,8,10,16][0,4,4,8]$ | Max $=[2,10,10,16][8,12,12,16]$ |

Allen* Min $=$ during $[2,2,6,6]$, Max $=$ overlapped_by $[10,14,14,16]$
met_by x started_by ->
Allen* relations : 520 elts
finished_by (11 elts)
meets (13 elts)
overlaps (13 elts)
$\operatorname{Min}=[4,7,8,11][0,3,4,7]$
Max $=[8,11,12,15]$
contains (21 elts)
$\operatorname{Min}=[4,5,8,9][0,1,2,5]$
Max $=[8,9,12,13]$
Min $=[4,6,8,10][0,2,2,6] \quad$ Max $=[8,10,12,14]$
$\operatorname{Min}=[4,8,8,12][0,4,4,8] \quad \operatorname{Max}=[8,12,12,16]$
Allen* Min $=$ meets $[4,5,8,9][0,1,2,5], \operatorname{Max}=$ contains $[8,12,12,16]$
met_by x finishes ->
Allen* relations : 98 elts
finished_by (1 elts)
meets (5 elts)
met_by (98 elts)
overlaps (5 elts)
contains (3 elts)
Allen* Min $=$ met by $[3,4,7,8] \quad$ Max $=$ met by $[11,14,15,16]$
met_by x finished_by ->
Allen* relations : 98 elts
finished_by (1 elts)
meets ( 5 elts)
met_by (98 elts)
overlaps (5 elts)
contains (3 elts)
Allen* Min = met by
-----------------
met_by x meets ->
Allen* relations : 166 elts start (6 elts)
started_by (54 elts)
finished_by (1 elts)
meets (1 elts)
overlaps (1 elts)
contains (1 elts)
subset ( 6 elts)
Allen* Min $=$ start $[1,2,5,6], \operatorname{Max}=\operatorname{started\_ by~}[9,12,13,16]$
met_by x met_by ->
Allēn* relations : 980 elts
start (3 elts)
started_by (11 elts)
finishes (3 elts)
finished_by (11 elts)
meets (17 elts)
overlaps (17 elts)
overlapped_by (25 elts)
during (3 elts)
contains (21 elts)
subset (3 elts)
Allen* Min $=$ meets $[4,5,8,9]$
met_by x overlaps ->
Allen* relations : 234 elts
finishes (6 elts)
finished_by (1 elts)
meets (5 elts)
overlaps (5 elts)
overlapped_by (98 elts)
during (6 elts)
contains (3 elts)
Min $=[2,8,10,16][0,4,4,8]$
$\operatorname{Min}=[2,3,6,7]$
Min $=[2,7,10,15][0,3,4,7]$
$\operatorname{Min}=[2,5,6,9][0,1,2,5]$
$\operatorname{Min}=[2,6,6,10][0,2,2,6]$
$\operatorname{Min}=[2,4,6,8]$
$\operatorname{Min}=[2,2,6,6]$
$\operatorname{Min}=[2,8,10,16][0,4,4,8] \quad \operatorname{Max}=[2,10,10,16][8,12,12,16]$
Allen* Min $=$ during $[2,2,6,6]$, Max $=$ overlapped_by $[10,14,14,16]$

Min $=[3,7,11,15][0,3,4,7]$
Min $=[3,5,7,9][0,1,2,5]$
$\operatorname{Min}=[3,4,7,8]$
Min $=[3,6,7,10][0,2,2,6]$
Min $=[3,8,11,16][0,4,4,8]$

Min $=[3,7,11,15][0,3,4,7]$
Min $=[3,5,7,9][0,1,2,5]$
$\operatorname{Min}=[3,4,7,8]$
$\operatorname{Min}=[3,6,7,10][0,2,2,6]$
Min $=[3,8,11,16][0,4,4,8]$
$\operatorname{Max}=[3,7,11,15][8,11,12,15]$
$\operatorname{Max}=[7,9,11,13][8,9,12,13]$
Max $=[11,14,15,16]$
Max $=[7,10,11,14][8,10,12,14]$
$\operatorname{Max}=[3,10,11,16][8,12,12,16]$
$\operatorname{Max}=[3,7,11,15][8,11,12,15]$
Max $=[7,9,11,13][8,9,12,13]$
Max $=[11,14,15,16]$
$\operatorname{Max}=[7,10,11,14][8,10,12,14]$
$\operatorname{Max}=[3,10,11,16][8,12,12,16]$

| Min $=[1,2,5,6]$ | Max $=[9,10,13,14]$ |
| :---: | :---: |
| Min $=[1,4,5,8]$ | Max $=[9,12,13,16]$ |
| Min $=[1,7,9,15][0,3,4,7]$ | Max $=[1,7,9,15][8,11,12,15]$ |
| Min $=[1,5,9,13][0,1,2,5]$ | Max $=[1,5,9,13][8,9,12,13]$ |
| Min $=[1,6,9,14][0,2,2,6]$ | Max $=[1,6,9,14][8,10,12,14]$ |
| Min $=[1,8,9,16][0,4,4,8]$ | Max $=[1,8,9,16][8,12,12,16]$ |
| Min $=[1,3,5,7]$ | Max $=[9,11,13,15]$ |

$\operatorname{Min}=[5,6,9,10][1,2,5,6] \quad \operatorname{Max}=[9,10,13,14]$

Min $=[5,8,9,12][1,4,5,8] \quad \operatorname{Max}=[9,12,13,16]$
$\operatorname{Min}=[6,7,10,11][2,3,6,7] \quad \operatorname{Max}=[10,11,14,15]$
$\operatorname{Min}=[4,7,8,11][0,3,4,7] \quad \operatorname{Max}=[8,11,12,15]$
$\operatorname{Min}=[4,5,8,9][0,1,2,5] \quad \operatorname{Max}=[8,9,12,13]$
Min $=[4,6,8,10][0,2,2,6] \quad \operatorname{Max}=[8,10,12,14]$
$\operatorname{Min}=[6,8,10,12][2,4,6,8] \quad \operatorname{Max}=[10,14,14,16]$
$\operatorname{Min}=[6,6,10,10][2,2,6,6] \quad$ Max $=[10,10,14,14]$
$\operatorname{Min}=[4,8,8,12][0,4,4,8] \quad \operatorname{Max}=[8,12,12,16]$
$\operatorname{Min}=[5,7,9,11][1,3,5,7] \quad \operatorname{Max}=[9,11,13,15]$
$[0,1,2,5]$, Max $=$ overlapped_by $[10,14,14,16]$
met_by x overlapped_by ->
Allen* relations : 980 elts
start (3 elts)
started_by (11 elts)
finishes (3 elts)
finished_by (11 elts)
meets (17 elts)
overlaps (17 elts)
overlapped_by (25 elts)
during (3 elts)
contains (21 elts)
subset (3 elts)

Min $=[5,6,9,10][1,2,5,6]$
$\operatorname{Min}=[5,8,9,12][1,4,5,8]$
Min $=[6,7,10,11][2,3,6,7]$
$\operatorname{Min}=[4,7,8,11][0,3,4,7]$
Min $=[4,5,8,9][0,1,2,5]$
Min $=[4,6,8,10][0,2,2,6]$
Min $=[6,8,10,12][2,4,6,8]$
Min $=[6,6,10,10][2,2,6,6]$
$\operatorname{Min}=[4,8,8,12][0,4,4,8]$
Min $=[5,7,9,11][1,3,5,7] \quad$ Max $=[9,11,13,15]$

Allen* Min $=$ meets $[4,5,8,9][0,1,2,5]$, Max $=$ overlapped_by $[10,14,14,16]$
met_by x during ->
Allen* relations : 234 elts
finishes (6 elts) $\quad$ Min $=[2,3,6,7]$
Max $=[10,11,14,15]$
finished_by (1 elts)
meets (5 elts)
overlaps (5 elts)
overlapped_by (98 elts)
during ( 6 elts)
contains (3 elts)
Allen* Min = during $[2,2,6,6], \operatorname{Max}=$ overlapped_by $[10,14,14,16]$

Min $=[2,7,10,15][0,3,4,7]$
Min $=[2,5,6,9][0,1,2,5]$
$\operatorname{Min}=[2,6,6,10][0,2,2,6]$
Min $=[2,4,6,8]$
Min $=[2,2,6,6]$
Min $=[2,8,10,16][0,4,4,8]$
met_by x contains ->
Allen* relations : 520 elts finished_by (11 elts)
meets (1 $\overline{3}$ elts)
overlaps (13 elts)
$\operatorname{Min}=[4,7,8,11][0,3,4,7] \quad \operatorname{Max}=[8,11,12,15]$
Min $=[4,5,8,9][0,1,2,5] \quad$ Max $=[8,9,12,13]$
contains (21 elts) $\quad$ Min $=[4,8,8,12][0,4,4,8] \quad$ Max $=[8,12,12,16]$
Allen* Min $=$ meets $[4,5,8,9][0,1,2,5], \operatorname{Max}=\operatorname{contains}[8,12,12,16]$
met_by x subset ->
Allen* relations : 98 elts
finished_by (1 elts)
meets (5 elts)
met_by (98 elts)
Min $=[3,7,11,15][0,3,4,7]$
$\operatorname{Max}=[3,7,11,15][8,11,12,15]$
$\operatorname{Min}=[3,5,7,9][0,1,2,5]$
Max $=[7,9,11,13][8,9,12,13]$
overlaps (5 elts)
Min $=[3,4,7,8]$
Max $=[11,14,15,16]$
contains ( 3 elts)
Min $=[3,6,7,10][0,2,2,6]$
$\operatorname{Max}=[7,10,11,14][8,10,12,14]$
$\operatorname{Max}=[3,10,11,16][8,12,12,16]$
Allen* Min $=$ met_by $[3,4,7,8], \operatorname{Max}=\operatorname{met}$ by $[11,14,15,16]$
overlaps x precedes ->
Allen* relations : 1 elts
precedes (1 elts) $\quad \operatorname{Min}=[0,0,0,0] \quad \operatorname{Max}=[0,0,0,0]$
Allen* Min $=$ precedes $[0,0,0,0], \operatorname{Max}=\operatorname{precedes}[0,0,0,0]$
overlaps x preceded_by ->
Allen* relations : $\overline{1} 7$ elts
preceded_by (1 elts) Min $=[16,16,16,16] \quad$ Max $=[16,16,16,16]$
Allen* Min $=$ preceded_by $[16,16,16,16]$, Max $=$ preceded_by $[16,16,16,16]$
overlaps x start ->
Allen* relations : 98 elts
started_by (1 elts)
met_by (5 elts)
overlaps (98 elts)
overlapped_by (5 elts)
contains ( 3 elts)

Min $=[1,6,9,14][1,4,5,8]$
$\operatorname{Min}=[3,6,7,10][3,4,7,8]$
$\operatorname{Min}=[0,2,2,6]$
$\begin{array}{ll}\operatorname{Min}=[0,2,2,6] & \operatorname{Max}=[8,10,12,14] \\ \text { Min }=[2,6,6,10][2,4,6,8] & \operatorname{Max}=[6,10,10,14][10,14,14,16]\end{array}$
$\operatorname{Min}=[0,6,6,14][0,4,4,8] \quad \operatorname{Max}=[0,6,8,14][8,12,12,16]$

Max $=[1,6,9,14][9,12,13,16]$
$\operatorname{Max}=[7,10,11,14][11,14,15,16]$
Max $=[8,10,12,14]$

Allen* Min $=$ overlaps $[0,2,2,6]$, Max $=$ overlaps $[8,10,12,14]$
overlaps x started_by ->
Allen* relations : 740 elts
started_by (9 elts)
finished_by (54 elts)
met_by ( 25 elts)
overlaps (98 elts)
overlapped_by (25 elts)
$\operatorname{Min}=[0,4,4,8] \quad$ Max $=[8,12,12,16]$
Max $=[1,8,9,16][9,12,13,16]$
$\operatorname{Min}=[1,6,9,14][1,4,5,8]$
Min $=[0,3,4,7]$
$\operatorname{Min}=[3,6,7,10][3,4,7,8]$
$\operatorname{Min}=[0,2,2,6]$
Min $=[2,6,6,10][2,4,6,8]$
Max $=[8,11,12,15]$
Max $=[7,10,11,16][11,14,15,16]$
$\operatorname{Max}=[8,10,12,14]$
Max $=[6,10,10,16][10,14,14,16]$

Allen* Min $=$ overlaps $[0,2,2,6], \operatorname{Max}=$ contains $[8,12,12,16]$
--------------
overlaps x finishes ->
Allen* relations : 234 elts start (6 elts)
started_by (1 elts)
met_by (5 elts)
overlaps (98 elts)
overlapped_by (5 elts)
during ( 6 elts)
contains (3 elts)

Min $=[1,2,5,6]$
Min $=[1,6,9,14][1,4,5,8]$
$\operatorname{Min}=[3,6,7,10][3,4,7,8]$
$\operatorname{Min}=[0,2,2,6]$
$\operatorname{Min}=[2,6,6,10][2,4,6,8]$
$\operatorname{Min}=[2,2,6,6]$
$\operatorname{Min}=[0,6,6,14][0,4,4,8]$
$\operatorname{Max}=[9,10,13,14]$
Max $=[1,6,9,14][9,12,13,16]$
$\operatorname{Max}=[7,10,11,14][11,14,15,16]$
$\operatorname{Max}=[8,10,12,14]$
$\operatorname{Max}=[6,10,10,14][10,14,14,16]$
Max $=[10,10,14,14]$
$\operatorname{Max}=[0,6,8,14][8,12,12,16]$

```
Allen* Min = overlaps [0,2,2,6] , Max = during [10,10,14,14]
```

overlaps x finished_by ->
Allen* relations : 1568 elts
started_by (25 elts) $\quad \operatorname{Min}=[1,4,5,8]$
meets (98 elts)
met_by (51 elts)
overlaps (98 elts)
overlapped_by (51 elts)
contains (55 elts)
$\begin{array}{ll}\text { contains (55 elts) } & \text { Min }=[0,4,4,8] \\ \text { Allen* Min }=\text { meets }[0,1,2,5], \operatorname{Max}=\text { overlaps }[8,10,12,14]\end{array}$
overlaps x meets ->
Allen* relations : 980 elts start (3 elts)
started_by (11 elts)
finishes (3 elts)
finished_by (11 elts)
met_by (17 elts)
overlaps (25 elts)
overlapped_by (17 elts)
during (3 elts)
contains (21 elts)

Allen* Min = overlaps $[0,2,2,6]$, Max $=$ met_by $[7,8,11,12]$
overlaps x met_by ->
Allen* relations : 734 elts
started_by (53 elts)
meets (25 elts)
met_by (3 elts)
overlaps (25 elts)
overlapped_by (97 elts)
contains (168 elts)

Min $=[0,1,2,5]$
$\operatorname{Min}=[3,4,7,8]$
Min $=[0,2,2,6]$
$\operatorname{Min}=[2,4,6,8]$
$\operatorname{Min}=[0,4,4,8]$

Max $=[5,8,9,14][9,12,13,16]$
Max $=[8,9,12,13]$
$\operatorname{Max}=[7,10,11,14][11,14,15,16]$
Max $=[8,10,12,14]$
$\operatorname{Max}=[6,10,10,14][10,14,14,16]$
Max $=[4,8,8,14][8,12,12,16]$

```
Allen* Min \(=\) contains \([0,4,4,8]\), Max \(=\) overlapped_by [10,14,14,16]
```

overlaps x overlaps ->
Allen* relations : 1867 elts
start (3 elts)
started_by (25 elts)
finishes (3 elts)
finished_by (11 elts)
meets ( 98 elts)
met_by (51 elts)
overlaps (98 elts)
overlapped_by (51 elts)
during (3 elts)
contains (55 elts)
subset (3 elts)
Allen* Min $=$ meets $[0,1,2,5], \operatorname{Max}=$ overlaps $[8,10,12,14]$
overlaps x overlapped_by ->
Allen* relations : $22 \overline{6} 9$ elts
start (6 elts)
started_by (54 elts)
finishes (6 elts)
finished_by (54 elts)
meets (25 elts)
met_by (25 elts)
overlaps (98 elts)
overlapped_by (98 elts)
during ( 6 elts)
contains (169 elts)
subset ( 6 elts)
subset (6 elts) $\quad$ Min $=[1,3,5,7]$

Max $=[5,6,9,10][9,10,13,14]$
$\operatorname{Max}=[5,8,9,14][9,12,13,16]$
$\operatorname{Max}=[6,7,10,11][10,11,14,15]$
$\operatorname{Max}=[4,7,8,11][8,11,12,15]$
Max $=[8,9,12,13]$
$\operatorname{Max}=[7,10,11,14][11,14,15,16]$
$\operatorname{Max}=[8,10,12,14]$
$\operatorname{Max}=[6,10,10,14][10,14,14,16]$
$\operatorname{Max}=[6,6,10,10][10,10,14,14]$
$\operatorname{Max}=[4,8,8,14][8,12,12,16]$
$\operatorname{Max}=[5,7,9,11][9,11,13,15]$

Allen* Min $=$ overlaps $[0,2,2,6]$, Max $=$ overlapped_by $[10,14,14,16]$
overlaps x during ->

Allen* relations : 234 elts
start (6 elts)
started_by (1 elts)
met_by (5 elts)
overlaps (98 elts)
overlapped_by (5 elts)
during ( 6 elts)
contains (3 elts)
contains (3 elts) $\quad \operatorname{Min}=[0,6,6,14][0,4,4,8]$
$\operatorname{Min}=[1,2,5,6]$
$\operatorname{Min}=[1,6,9,14][1,4,5,8]$
$\operatorname{Min}=[3,6,7,10][3,4,7,8]$
$\operatorname{Min}=[0,2,2,6]$
$\operatorname{Min}=[2,6,6,10][2,4,6,8]$
$\operatorname{Min}=[2,2,6,6]$

Max $=[9,10,13,14]$
Max $=[1,6,9,14][9,12,13,16]$
$\operatorname{Max}=[7,10,11,14][11,14,15,16]$
$\operatorname{Max}=[8,10,12,14]$
Max $=[6,10,10,14][10,14,14,16]$
Max $=[10,10,14,14]$
Max $=[0,6,8,14][8,12,12,16]$

Allen* Min $=$ overlaps $[0,2,2,6]$, Max $=$ during $[10,10,14,14]$
overlaps x contains ->
Allen* relations : 2505 elts
started_by (39 elts)
finished_by (54 elts)
meets (98 elts)
met_by (77 elts)
overlaps (98 elts)
overlapped_by (77 elts)
contains (169 elts)

Min $=[1,4,5,8]$
$\operatorname{Min}=[0,3,4,7]$
$\operatorname{Min}=[0,1,2,5]$
$\operatorname{Min}=[3,4,7,8]$
$\operatorname{Min}=[0,2,2,6]$
Min $=[2,4,6,8]$
$\operatorname{Min}=[0,4,4,8]$

Max $=[5,8,9,16][9,12,13,16]$
$\operatorname{Max}=[8,11,12,15]$
Max $=[8,9,12,13]$
$\operatorname{Max}=[7,10,11,16][11,14,15,16]$
$\operatorname{Max}=[8,10,12,14]$
$\operatorname{Max}=[6,10,10,16][10,14,14,16]$
$\operatorname{Max}=[8,12,12,16]$

Allen* Min $=$ meets $[0,1,2,5]$, Max $=$ contains $[8,12,12,16]$
overlaps x subset ->
Allen* relations : 98 elts
started_by (1 elts)
met_by (5 elts)
$\operatorname{Min}=[1,6,9,14][1,4,5,8] \quad \operatorname{Max}=[1,6,9,14][9,12,13,16]$
$\operatorname{Min}=[3,6,7,10][3,4,7,8] \quad \operatorname{Max}=[7,10,11,14][11,14,15,16]$
overlaps (98 elts)
$\operatorname{Min}=[0,2,2,6]$
overlapped_by (5 elts)
contains ( $\overline{3}$ elts)
$\operatorname{Min}=[2,6,6,10][2,4,6,8] \quad \operatorname{Max}=[6,10,10,14][10,14,14,16]$
Allen* Min $=$ overlaps $[0,2,2,6]$, Max $=$ overlaps $[8,10,12,14]$
overlapped_by x precedes ->
Allen* relations : 17 elts
precedes (1 elts) $\quad \operatorname{Min}=[0,0,0,0] \quad \operatorname{Max}=[0,0,0,0]$
Allen* Min $=\operatorname{precedes}[0,0,0,0]$, Max $=\operatorname{precedes}[0,0,0,0]$
overlapped_by x preceded_by ->
Allen* relations : 1 elts
preceded_by (1 elts) $\quad$ Min $=[16,16,16,16] \quad$ Max $=[16,16,16,16]$
Allen* Min = preceded_by $[16,16,16,16]$, Max $=$ preceded_by $[16,16,16,16]$
overlapped_by x start ->
Allen* relations : 234 elts
finishes (6 elts) $\quad \operatorname{Min}=[2,3,6,7] \quad \operatorname{Max}=[10,11,14,15]$
finished_by (1 elts)
Min $=[2,7,10,15][0,3,4,7]$
Max $=[2,7,10,15][8,11,12,15]$
meets ( 5 elts) $\quad$ Min $=[2,5,6,9][0,1,2,5]$
$\operatorname{Max}=[6,9,10,13][8,9,12,13]$
overlaps (5 elts)
overlapped_by (98 elts)
$\operatorname{Min}=[2,6,6,10][0,2,2,6]$
$\operatorname{Max}=[6,10,10,14][8,10,12,14]$
during ( 6 elts)
$\operatorname{Min}=[2,4,6,8]$
Max $=[10,14,14,16]$
contains (3 elts)
$\operatorname{Min}=[2,2,6,6]$
$\operatorname{Max}=[10,10,14,14]$
Allen* Min = during $[2,2,6,6]$, Max = overlapped_by $[10,14,14,16]$
overlapped_by x started_by ->
Allen* relations : 1568 elts
finished_by (25 elts) Min $=[2,7,8,11][0,3,4,7]$
Max $=[8,11,12,15]$
meets (51 elts)
met_by (98 elts)
Min $=[2,5,6,9][0,1,2,5]$
$\operatorname{Max}=[8,9,12,13]$
overlaps (51 elts)
overlapped_by (98 elts)
Min $=[3,4,7,8]$
Max $=[11,14,15,16]$
Min $=[2,6,6,10][0,2,2,6]$
$\operatorname{Max}=[8,10,12,14]$
contains (55 elts)
$\operatorname{Min}=[2,4,6,8]$
Max $=[10,14,14,16]$
Allen* Min = overlapped_by $[2,4,6,8]$, Max $=$ met_by $[11,14,15,16]$
overlapped_by x finishes ->
Allen* relations : 98 elts
finished_by (1 elts) $\quad \operatorname{Min}=[2,7,10,15][0,3,4,7]$
meets (5 elts)
overlaps (5 elts)
$\operatorname{Min}=[2,5,6,9][0,1,2,5]$
$\operatorname{Min}=[2,6,6,10][0,2,2,6]$
$\operatorname{Max}=[2,7,10,15][8,11,12,15]$
$\operatorname{Min}=[2,4,6,8]$
$\operatorname{Max}=[6,9,10,13][8,9,12,13]$
$\operatorname{Max}=[6,10,10,14][8,10,12,14]$
$\operatorname{Max}=[10,14,14,16]$
contains (3 elts) Min $=[2,8,10,16][0,4,4,8] \quad$ Max $=[2,10,10,16][8,12,12,16]$
Allen* Min = overlapped_by $[2,4,6,8]$, Max = overlapped_by $[10,14,14,16]$
overlapped_by x finished_by ->
Allen* relations : 740 elts
started by (54 elts) Min = [1,4,5,8]
finished_by (9 elts)
meets (25 elts)
overlaps (25 elts)
overlapped_by (98 elts)
contains (166 elts)

Max $=[9,12,13,16]$
$\operatorname{Max}=[2,7,10,15][8,11,12,15]$
Max $=[6,9,10,13][8,9,12,13]$
$\operatorname{Max}=[6,10,10,14][8,10,12,14]$
Max $=[10,14,14,16]$
Max $=[8,12,12,16]$

Allen* Min $=$ contains $[0,4,4,8]$, Max $=$ overlapped_by $[10,14,14,16]$
overlapped_by x meets ->
Allen* relations : 734 elts
finished_by (53 elts) $\quad \operatorname{Min}=[0,3,4,7] \quad$ Max $=[8,11,12,15]$
meets (3 elts) $\quad \operatorname{Min}=[0,5,6,13][0,1,2,5]$
met by (25 elts) Min = [3,6,7,10][3,4,7,8]
Min $=[0,2,2,6]$
$\operatorname{Max}=[0,5,8,13][8,9,12,13]$
met_oy (25 elts)
$\operatorname{Min}=[2,6,6,10][2,4,6,8] \quad \operatorname{Max}=[6,10,10,16][10,14,14,16]$
overlapped by (25 elts)
Min $=[0,4,4,8] \quad \operatorname{Max}=[8,12,12,16]$
contains (168 elts) $\quad$ Min $=[0,4,4,8]$
Allen* Min $=$ overlaps $[0,2,2,6], \operatorname{Max}=$ contains $[8,12,12,16]$
overlapped_by x met_by ->
Allen* relations : 980 elts
start (3 elts)
started_by (11 elts)
finishes (3 elts)
finished_by (11 elts)
meets (17 elts)
overlaps (17 elts)
overlapped_by (25 elts)
during (3 elts)
contains (21 elts)
subset (3 elts)

| $\mathrm{n}=[5,6,9,10][1,2,5,6]$ | $\operatorname{Max}=[9,10,13,14]$ |
| :---: | :---: |
| Min $=[5,8,9,12][1,4,5,8]$ | Max $=[9,12,13,16]$ |
| Min $=[6,7,10,11][2,3,6,7]$ | Max $=[10,11,14,15]$ |
| Min $=[4,7,8,11][0,3,4,7]$ | Max $=[8,11,12,15]$ |
| Min $=[4,5,8,9][0,1,2,5]$ | Max $=[8,9,12,13]$ |
| Min $=[4,6,8,10][0,2,2,6]$ | Max $=[8,10,12,14]$ |
| Min $=[6,8,10,12][2,4,6,8]$ | Max $=[10,14,14,16]$ |
| Min $=[6,6,10,10][2,2,6,6]$ | Max $=[10,10,14,14]$ |
| Min $=[4,8,8,12][0,4,4,8]$ | Max $=[8,12,12,16]$ |
| Min $=[5,7,9,11][1,3,5,7]$ | Max $=[9,11,13,15]$ |
| [0,1,2,5], Max = overlapped | [10,14,14,16] |

Allen* Min $=$ meets $[4,5,8,9][0,1,2,5]$, Max $=$ overlapped_by $[10,14,14,16]$
overlapped_by x overlaps ->
Allen* relations : 2269 elts
start (6 elts) Min = [1,2,5,6]
Max $=[9,10,13,14]$
started_by (54 elts)
finishes (6 elts)
Min $=[1,4,5,8]$
$\operatorname{Max}=[9,12,13,16]$
finished_by (54 elts)
Min $=[2,3,6,7]$
Max $=[10,11,14,15]$
Min $=[0,3,4,7]$
Max $=[8,11,12,15]$
meets (25 elts) $\quad \operatorname{Min}=[0,5,6,9][0,1,2,5]$
$\operatorname{Max}=[6,9,10,13][8,9,12,13]$
met_by (25 elts)
Min $=[3,6,7,10][3,4,7,8]$
$\operatorname{Max}=[7,10,11,16][11,14,15,16]$
overlaps (98 elts)
$\operatorname{Min}=[0,2,2,6]$
Max $=[8,10,12,14]$
overlapped_by (98 elts)
$\operatorname{Min}=[2,4,6,8]$
Max $=[10,14,14,16]$
$\operatorname{Min}=[2,2,6,6] \quad \operatorname{Max}=[10,10,14,14]$
Min $=[0,4,4,8] \quad$ Max $=[8,12,12,16]$
contains (169 elts)
Max $=[9,11,13,15]$
subset ( 6 elts) $\quad \operatorname{Min}=[1,3,5,7]$
Allen* Min $=$ overlaps $[0,2,2,6]$, Max $=$ overlapped_by $[10,14,14,16]$
overlapped_by x overlapped_by ->
Allen* relations : 1867 elts
start (3 elts) $\quad \operatorname{Min}=[5,6,9,10][1,2,5,6] \quad \operatorname{Max}=[9,10,13,14]$
started_by (11 elts) Min = [5,8,9,12][1,4,5,8] Max = [9,12,13,16]
finishes (3 elts)
$\operatorname{Min}=[6,7,10,11][2,3,6,7] \quad \operatorname{Max}=[10,11,14,15]$
$\operatorname{Min}=[2,7,8,11][0,3,4,7] \quad \operatorname{Max}=[8,11,12,15]$
Min $=[2,5,6,9][0,1,2,5] \quad$ Max $=[8,9,12,13]$
Min $=[3,4,7,8]$
Max $=[11,14,15,16]$
Min $=[2,6,6,10][0,2,2,6] \quad \operatorname{Max}=[8,10,12,14]$
$\operatorname{Min}=[2,4,6,8] \quad \operatorname{Max}=[10,14,14,16]$
$\operatorname{Min}=[6,6,10,10][2,2,6,6] \quad \operatorname{Max}=[10,10,14,14]$
$\operatorname{Min}=[2,8,8,12][0,4,4,8] \quad \operatorname{Max}=[8,12,12,16]$
$\operatorname{Min}=[5,7,9,11][1,3,5,7] \quad \operatorname{Max}=[9,11,13,15]$
$\begin{array}{ll}\text { subset (3 elts) } & \text { Min }=[5,7,9,11][1,3,5,7] \\ \text { Allen* Min }=\text { overlapped by }[2,4,6,8] \text {, Max }=\text { met_by }[11,14,15,16]\end{array}$

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```

overlapped_by x during ->
Allen* relations : 234 elts finishes (6 elts)
finished_by (1 elts)
meets (5 elts)
overlaps (5 elts)
overlapped_by (98 elts)
during (6 elts)
contains (3 elts)
$\operatorname{Min}=[2,3,6,7]$
Min $=[2,7,10,15][0,3,4,7]$
$\operatorname{Min}=[2,5,6,9][0,1,2,5]$
Min $=[2,6,6,10][0,2,2,6]$
Min $=[2,4,6,8]$
Min $=[2,2,6,6]$
$\operatorname{Min}=[2,8,10,16][0,4,4,8] \quad \operatorname{Max}=[2,10,10,16][8,12,12,16]$

Allen* Min $=$ during $[2,2,6,6]$, Max $=$ overlapped_by [10,14,14,16]
-
overlapped_by x contains ->
Allen* relations : 2505 elts
started_by (54 elts)
finished_by (39 elts)
meets (77 elts)
met_by (98 elts)
overlaps (77 elts)
overlapped_by (98 elts)
contains (169 elts)
Allen* Min $=$ contains $[0,4,4,8], \operatorname{Max}=\operatorname{met}$ by $[11,14,15,16]$

```
Min = [0,7,8,11][0,3,4,7]
Min \(=[1,4,5,8]\)
```

Min $=[0,5,6,9][0,1,2,5]$
$\operatorname{Min}=[3,4,7,8]$
Min $=[0,6,6,10][0,2,2,6]$
Min $=[2,4,6,8]$
Min $=[0,4,4,8]$
overlapped by x subset ->
Allen* relations : 98 elts
finished by (1 elts) Min = [2,7,10,15] [0,3,4,7]
meets ( $5^{-}$elts) $\quad$ Min $=[2,5,6,9][0,1,2,5]$
overlaps (5 elts) Min = $[2,6,6,10][0,2,2,6]$
overlapped_by (98 elts)
contains (3 elts)
Min $=[2,4,6,8]$
$\operatorname{Max}=[9,12,13,16]$
Max $=[8,11,12,15]$
Max $=[8,9,12,13]$
Max $=[11,14,15,16]$
Max $=[8,10,12,14]$
$\operatorname{Max}=[10,14,14,16]$
Max $=[8,12,12,16]$

Max $=[2,7,10,15][8,11,12,15]$

Allen* Min = over
during x precedes ->
Allen* relations : 1 elts
precedes (1 elts) Min = [0,0,0,0] Max $=[0,0,0,0]$
Allen* Min $=$ precedes $[0,0,0,0]$, Max $=$ precedes $[0,0,0,0]$
during x preceded_by ->
Allen* relations $\overline{:} 1$ elts
preceded_by (1 elts) Min = [16,16,16,16] Max $=[16,16,16,16]$
Allen* Min = preceded_by [16,16,16,16] , Max = preceded_by [16,16,16,16]
during x start ->
Allen* relations : 6 elts
during (6 elts) $\quad$ Min $=[2,2,6,6] \quad$ Max $=[10,10,14,14]$
Allen* Min $=$ during $[2,2,6,6]$, Max $=$ during [10,10,14,14]
during x started_by ->
Allen* relations : 600 elts
finishes (6 elts)
Min $=[2,3,6,7]$
Max $=[10,11,14,15]$
met_by (30 elts)
Min $=[3,4,7,8] \quad$ Max $=[11,12,15,16][11,14,15,16]$
overlapped_by (30 elts)
$\operatorname{Min}=[2,4,6,8]$
Max $=[10,12,14,16][10,14,14,16]$
during (6 elts) $\quad$ Min $=[2,2,6,6]$
Max $=[10,10,14,14]$
Allen* Min = during $[2,2,6,6]$, Max $=$ met_by $[11,12,15,16][11,14,15,16]$
during x finishes ->
Allen* relations : 6 elts
during (6 elts) $\quad$ Min $=[2,2,6,6] \quad$ Max $=[10,10,14,14]$
Allen* Min $=$ during $[2,2,6,6]$, Max $=$ during $[10,10,14,14]$
during x finished_by ->
Allen* relations : 600 elts
start (6 elts)
meets (30 elts)

```
Max \(=[9,10,13,14]\)
```

$\operatorname{Min}=[0,1,4,5][0,1,2,5]$
overlaps (30 elts)
Min $=[0,2,4,6][0,2,2,6]$
Max $=[8,9,12,13]$
during (6 elts)
$\operatorname{Min}=[2,2,6,6]$
Max $=[8,10,12,14]$

Allen* Min $=$ meets $[0,1,4,5][0,1,2,5]$, Max $=$ during $[10,10,14,14]$
during x meets ->
Allen* relations : 340 elts finishes (3 elts)
met_by (11 elts)
overlapped_by (11 elts)
during (3 elts)

Max $=[6,7,10,11][10,11,14,15]$
Max $=[7,8,11,12][11,14,15,16]$
Max $=[6,8,10,12][10,14,14,16]$
Max $=[6,6,10,10][10,10,14,14]$
Min $=[2,2,6,6]$

Allen* Min = during $[2,2,6,6]$, Max $=$ met_by $[7,8,11,12][11,14,15,16]$
during x met by ->
Allen* relations : 340 elts
start (3 elts)
meets (11 elts)
overlaps (11 elts)
during (3 elts)
Allen* Min $=$ meets $[4,5,8,9]$
during x overlaps ->
Allen* relations : 1401 elts
start (6 elts)
finishes (3 elts)
meets (80 elts)
met_by (51 elts)
overlaps (80 elts)
overlapped_by (51 elts)
during (6 elts)
Min $=[5,6,9,10][1,2,5,6] \quad \operatorname{Max}=[9,10,13,14]$
$\operatorname{Min}=[4,5,8,9][0,1,2,5] \quad \operatorname{Max}=[8,9,12,13]$
Min $=[4,6,8,10][0,2,2,6] \quad \operatorname{Max}=[8,10,12,14]$
$\operatorname{Min}=[6,6,10,10][2,2,6,6] \quad \operatorname{Max}=[10,10,14,14]$
[0,1,2,5], Max = during [10,10,14,14]

Min $=[1,2,5,6] \quad$ Max $=[9,10,13,14]$
$\operatorname{Min}=[2,3,6,7] \quad$ Max $=[6,7,10,11][10,11,14,15]$
Min $=[0,1,2,5] \quad$ Max $=[8,9,12,13]$
Min $=[3,4,7,8] \quad \operatorname{Max}=[7,10,11,14][11,14,15,16]$
Min $=[0,2,2,6] \quad$ Max $=[8,10,12,14]$
$\operatorname{Min}=[2,4,6,8] \quad \operatorname{Max}=[6,10,10,14][10,14,14,16]$
Min $=[2,2,6,6] \quad$ Max $=[10,10,14,14]$
Allen* Min $=$ meets $[0,1,2,5], \operatorname{Max}=\operatorname{during}[10,10,14,14]$
during x overlapped_by ->
Allen* relations : 1401 elts
start (3 elts)
finishes (6 elts)
meets (51 elts)
met by ( 80 elts)
overlaps (51 elts)
overlapped by (80 elts)
during (6 elts)
Allen* Min $=$ during $[2,2,6,6]$, Max $=$ met_by $[11,14,15,16]$
during x during ->
Allen* relations : 6 elts
during (6 elts) $\quad$ Min $=[2,2,6,6] \quad$ Max $=[10,10,14,14$
Allen* Min = during [2,2,6,6] , Max = during [10,10,14,14]
during x contains ->
Allen* relations : 2441 elts start (6 elts)
started by (30 elts)
finishes (6 elts)
finished by (30 elts)
meets (50 elts)
met_by (50 elts)
overlaps (50 elts)
overlapped_by (50 elts)
during (6 elts)
contains (56 elts)
subset (6 elts)
Min $=[5,6,9,10][1,2,5,6]$
Max $=[9,10,13,14]$
$\operatorname{Min}=[2,3,6,7]$
Max $=[10,11,14,15$
Min $=[2,5,6,9][0,1,2,5]$
Max $=[8,9,12,13]$
Min $=[3,4,7,8]$
Max $=[11,14,15,16]$
Min $=[2,6,6,10][0,2,2,6] \quad \operatorname{Max}=[8,10,12,14]$
Min $=[2,4,6,8]$
Max $=[10,14,14,16]$
Min $=[2,2,6,6]$
Max $=[10,10,14,14]$

Allen* Min $=\operatorname{meets}[0,1,4,5][0,1,2,5], \operatorname{Max}=\operatorname{met}$ by $[11,12,15,16][11,14,15,16]$
-----------------
during x subset ->
Allen* relations : 6 elts
during (6 elts) Min = [2,2,6,6] Max = [10,10,14,14]
Allen* Min $=$ during $[2,2,6,6], \operatorname{Max}=$ during $[10,10,14,14]$
contains x precedes ->
Allen* relations : 17 elts
precedes (1 elts) Min = [0,0,0,0] Max $=[0,0,0,0]$
Allen* Min $=$ precedes $[0,0,0,0]$, Max $=\operatorname{precedes}[0,0,0,0]$
contains x preceded_by ->
Allen* relations : 17 elts
preceded_by (1 elts) $\quad \operatorname{Min}=[16,16,16,16] \quad$ Max $=[16,16,16,16]$
Allen* Min = preceded_by $[16,16,16,16]$, Max = preceded_by $[16,16,16,16]$
contains x start ->
Allen* relations : 743 elts
started_by (9 elts)
Min $=[1,6,9,14][1,4,5,8]$
finished_by (54 elts)
meets (3 elts)
met_by (25 elts)
overlaps (98 elts)
overlapped_by (25 elts)
contains (169 elts)
$\operatorname{Min}=[0,3,4,7]$
Min $=[0,5,6,13][0,1,2,5]$
$\operatorname{Min}=[3,6,7,10][3,4,7,8]$
$\operatorname{Min}=[0,2,2,6]$
$\operatorname{Min}=[2,6,6,10][2,4,6,8]$
$\operatorname{Min}=[0,4,4,8]$

Max $=[1,8,9,16][9,12,13,16]$
Max $=[8,11,12,15]$
$\operatorname{Max}=[0,5,8,13][8,9,12,13]$
Max $=[7,10,11,16][11,14,15,16]$
$\operatorname{Max}=[8,10,12,14]$
$\operatorname{Max}=[6,10,10,16][10,14,14,16]$
Max $=[8,12,12,16]$

Allen* Min $=$ overlaps $[0,2,2,6], \operatorname{Max}=$ contains $[8,12,12,16]$
contains x started_by ->
Allen* relations : 169 elts
started_by (1 elts)
finishē__by (1 elts)
meets (3 elts)
met_by (3 elts)
overlaps (3 elts)
overlapped_by (3 elts)
contains (169 elts)

Min $=[1,8,9,16][1,4,5,8]$
Min $=[0,7,8,15][0,3,4,7]$
$\operatorname{Min}=[0,5,6,13][0,1,2,5]$
Min $=[3,8,11,16][3,4,7,8]$
$\operatorname{Min}=[0,6,6,14][0,2,2,6]$
Min $=[2,8,10,16][2,4,6,8]$
$\operatorname{Min}=[0,4,4,8]$

Max $=[1,8,9,16][9,12,13,16]$
$\operatorname{Max}=[0,7,8,15][8,11,12,15]$
$\operatorname{Max}=[0,5,8,13][8,9,12,13]$
$\operatorname{Max}=[3,10,11,16][11,14,15,16]$
Max $=[0,6,8,14][8,10,12,14]$
$\operatorname{Max}=[2,10,10,16][10,14,14,16]$
$\operatorname{Max}=[8,12,12,16]$

Allen* Min $=$ contains $[0,4,4,8]$, Max $=$ contains $[8,12,12,16]$
contains x finishes ->
Allen* relations : 743 elts
started_by (54 elts)
finished_by (9 elts)
$\operatorname{Min}=[1,4,5,8]$
$\operatorname{Min}=[0,7,8,15][0,3,4,7]$
Min $=[0,5,6,9][0,1,2,5]$
$\operatorname{Min}=[3,8,11,16][3,4,7,8]$
$\operatorname{Min}=[0,6,6,10][0,2,2,6]$
$\operatorname{Min}=[2,4,6,8]$
$\operatorname{Min}=[0,4,4,8]$

Max $=[9,12,13,16]$
Max $=[2,7,10,15][8,11,12,15]$
$\operatorname{Max}=[6,9,10,13][8,9,12,13]$
$\operatorname{Max}=[3,10,11,16][11,14,15,16]$
$\operatorname{Max}=[6,10,10,14][8,10,12,14]$
Max $=[10,14,14,16]$
$\operatorname{Max}=[8,12,12,16]$
contains (169 elts)
Allen* Min $=$ contains $[0,4,4,8]$, Max $=$ overlapped_by $[10,14,14,16]$
contains x finished_by ->
Allen* relations : 169 elts
started_by (1 elts)
finished_by (1 elts)
meets (3 elts)
met_by (3 elts)
overlaps (3 elts)
overlapped_by (3 elts)
contains (169 elts)

Min $=[1,8,9,16][1,4,5,8]$
$\operatorname{Min}=[0,7,8,15][0,3,4,7]$
$\operatorname{Min}=[0,5,6,13][0,1,2,5]$
$\operatorname{Min}=[3,8,11,16][3,4,7,8]$
$\operatorname{Min}=[0,6,6,14][0,2,2,6]$
Min $=[2,8,10,16][2,4,6,8]$
$\operatorname{Min}=[0,4,4,8]$

Max $=[1,8,9,16][9,12,13,16]$
$\operatorname{Max}=[0,7,8,15][8,11,12,15]$
Max $=[0,5,8,13][8,9,12,13]$
$\operatorname{Max}=[3,10,11,16][11,14,15,16]$
$\operatorname{Max}=[0,6,8,14][8,10,12,14]$
$\operatorname{Max}=[2,10,10,16][10,14,14,16]$
$\operatorname{Max}=[8,12,12,16]$

Allen* Min $=$ contains $[0,4,4,8]$, Max $=$ contains $[8,12,12,16]$
contains x meets ->
Allen* relations : 743 elts
started_by (9 elts)
finished_by (54 elts)
meets (3 elts)
met_by (25 elts)
overlaps (98 elts)
overlapped_by (25 elts)
contains (169 elts)
$\operatorname{Min}=[1,6,9,14][1,4,5,8]$
$\operatorname{Min}=[0,3,4,7]$
$\operatorname{Min}=[0,5,6,13][0,1,2,5]$
$\operatorname{Min}=[3,6,7,10][3,4,7,8]$
Min $=[0,2,2,6]$
$\operatorname{Min}=[2,6,6,10][2,4,6,8]$
$\operatorname{Min}=[0,4,4,8]$
$\operatorname{Max}=[1,8,9,16][9,12,13,16]$
Max $=[8,11,12,15]$
$\operatorname{Max}=[0,5,8,13][8,9,12,13]$
$\operatorname{Max}=[7,10,11,16][11,14,15,16]$
$\operatorname{Max}=[8,10,12,14]$
$\operatorname{Max}=[6,10,10,16][10,14,14,16]$
$\operatorname{Max}=[8,12,12,16]$

Allen* Min $=$ overlaps $[0,2,2,6]$, Max $=$ contains $[8,12,12,16]$
contains x met_by ->
Allen* relations : 743 elts
started_by (54 elts)
finished_by (9 elts)
meets ( $2 \overline{5}$ elts)

Min $=[1,4,5,8]$
Min $=[0,7,8,15][0,3,4,7]$
$\operatorname{Min}=[0,5,6,9][0,1,2,5]$
$\operatorname{Min}=[3,8,11,16][3,4,7,8]$
$\operatorname{Max}=[9,12,13,16]$
$\operatorname{Max}=[2,7,10,15][8,11,12,15]$
Max $=[6,9,10,13][8,9,12,13]$
$\operatorname{Max}=[3,10,11,16][11,14,15,16]$

| overlaps (25 elts) | Min $=[0,6,6,10][0,2,2,6]$ | Max $=[6,10,10,14][8,10,12,14]$ |
| :--- | :--- | :--- |
| overlapped by (98 elts) | Min $=[2,4,6,8]$ | Max $=[10,14,14,16]$ |

overlapped by (98 elts)
$\operatorname{Min}=[0,4,4,8] \quad \operatorname{Max}=[8,12,12,16]$
contains (169 elts)
Allen* Min = contains [0,4,4,8] , Max = overlapped_by [10,14,14,16]
contains x overlaps ->
Allen* relations : 743 elts
started by (9 elts)
finished by (54 elts)
meets (3 elts)
met by (25 elts)
overlaps (98 elts)
overlapped by (25 elts)
contains (169 elts)
Allen* Min $=$ overlaps $[0,2,2,6]$, Max $=$ contains $[8,12,12,16]$
contains x overlapped_by ->
Allen* relations : 743 elts
started_by (54 elts) $\quad$ Min $=[1,4,5,8]$
$\operatorname{Min}=[0,7,8,15][0,3,4,7] \quad \operatorname{Max}=[2,7,10,15][8,11,12,15]$
finished by (9 elts)
meets (25 elts)
met_by (3 elts)
overlaps (25 elts)
overlapped_by (98 elts)
contains (169 elts)
Min $=[0,5,6,9][0,1,2,5]$
$\operatorname{Max}=[6,9,10,13][8,9,12,13]$
$\operatorname{Min}=[3,8,11,16][3,4,7,8] \quad \operatorname{Max}=[3,10,11,16][11,14,15,16]$
$\operatorname{Min}=[0,6,6,10][0,2,2,6] \quad \operatorname{Max}=[6,10,10,14][8,10,12,14]$
$\operatorname{Min}=[2,4,6,8]$
Max $=[10,14,14,16]$
Min $=[0,4,4,8] \quad$ Max $=[8,12,12,16]$

Allen* Min $=$ contains $[0,4,4,8], \operatorname{Max}=$ overlapped_by $[10,14,14,16]$
contains x during ->
Allen* relations : 2269 elts
start (6 elts) Min $=[1,2,5,6] \quad \operatorname{Max}=[9,10,13,14]$
started_by (54 elts)
finishes (6 elts)
Min $=[1,4,5,8] \quad$ Max $=[9,12,13,16]$
inishes (6 elts) Min $=[2,3,6,7]$
Max $=[10,11,14,15]$
finished_by (54 elts)
meets (25 elts)
Min $=[0,3,4,7] \quad \operatorname{Max}=[8,11,12,15]$

Min $=[0,5,6,9][0,1,2,5]$
Max $=[6,9,10,13][8,9,12,13]$
met by (25 elts)
Min $=[3,6,7,10][3,4,7,8]$
Max $=[7,10,11,16][11,14,15,16]$
overlaps (98 elts)
overlapped_by (98 elts)
$\operatorname{Min}=[0,2,2,6]$
Max $=[8,10,12,14]$
Min $=[2,4,6,8] \quad$ Max $=[10,14,14,16]$
during (6 elts)
$\operatorname{Min}=[2,2,6,6] \quad \operatorname{Max}=[10,10,14,14]$
Min $=[0,4,4,8] \quad \operatorname{Max}=[8,12,12,16]$
contains (169 elts)
Min $=[1,3,5,7]$
Max = [9,11,13,15]
Allen* Min $=$ overlaps $[0,2,2,6]$, Max $=$ overlapped_by $[10,14,14,16]$
contains x contains ->
Allen* relations : 169 elts
started_by (1 elts) $\quad \operatorname{Min}=[1,8,9,16][1,4,5,8]$
finished_by (1 elts)
meets (3 elts)
met_by (3 elts)
overlaps (3 elts)
overlapped by (3 elts)
contains (169 elts)

$$
\operatorname{Min}=[0,7,8,15][0,3,4,7]
$$

$$
\operatorname{Min}=[0,5,6,13][0,1,2,5]
$$

$$
\operatorname{Min}=[3,8,11,16][3,4,7,8]
$$

$$
\operatorname{Min}=[0,6,6,14][0,2,2,6]
$$

Min $=[2,8,10,16][2,4,6,8]$
Min $=[0,4,4,8]$

Max $=[1,8,9,16][9,12,13,16]$
Max $=[0,7,8,15][8,11,12,15]$
Max $=[0,5,8,13][8,9,12,13]$
$\operatorname{Max}=[3,10,11,16][11,14,15,16]$
Max $=[0,6,8,14][8,10,12,14]$
$\operatorname{Max}=[2,10,10,16][10,14,14,16]$
Max $=[8,12,12,16]$

Allen* Min $=$ contains $[0,4,4,8]$, Max $=$ contains $[8,12,12,16]$
contains x subset ->
Allen* relations : 169 elts
started by (1 elts)
finished by (1 elts)
meets (3 elts)
met by (3 elts)
overlaps (3 elts)
overlapped by (3 elts)
contains (169 elts)
$\operatorname{Min}=[1,8,9,16][1,4,5,8]$
Min $=[0,7,8,15][0,3,4,7]$
$\operatorname{Min}=[0,5,6,13][0,1,2,5]$
Min $=[3,8,11,16][3,4,7,8]$
$\operatorname{Min}=[0,6,6,14][0,2,2,6]$
$\operatorname{Min}=[2,8,10,16][2,4,6,8]$
$\operatorname{Min}=[0,4,4,8]$

Max $=[1,8,9,16][9,12,13,16]$
Max $=[0,7,8,15][8,11,12,15]$
Max $=[0,5,8,13][8,9,12,13]$
Max $=[3,10,11,16][11,14,15,16]$
Max $=[0,6,8,14][8,10,12,14]$
$\operatorname{Max}=[2,10,10,16][10,14,14,16]$
$\operatorname{Max}=[8,12,12,16]$

Allen* Min $=$ contains $[0,4,4,8]$, Max $=$ contains $[8,12,12,16]$
subset x precedes ->
Allen* relations : 1 elts
precedes (1 elts)

```
Allen* Min = precedes [0,0,0,0] , Max = precedes [0,0,0,0]
```

subset x preceded_by ->
Allen* relations : 1 elts
preceded_by (1 elts) $\quad$ Min $=[16,16,16,16] \quad$ Max $=[16,16,16,16]$
Allen* Min $=$ preceded by $[16,16,16,16]$, Max $=$ preceded by $[16,16,16,16]$
subset x start ->
Allen* relations : 6 elts
start (6 elts) $\quad$ Min $=[1,2,5,6] \quad$ Max $=[9,10,13,14]$
Allen* Min $=$ start $[1,2,5,6]$, Max $=\operatorname{start}[9,10,13,14]$
subset x started_by ->
Allen* relations : 30 elts
started_by (30 elts) Min = [1,4,5,8] Max $=[9,12,13,16]$
Allen* $\operatorname{Min}=$ started_by $[1,4,5,8]$, Max $=$ started_by $[9,12,13,16]$
subset x finishes ->
Allen* relations : 6 elts
finishes (6 elts) Min = [2,3,6,7] Max $=[10,11,14,15]$
Allen* Min $=$ finishes $[2,3,6,7]$, Max $=$ finishes $[10,11,14,15]$
subset x finished_by ->
Allen* relations : 30 elts
finished_by (30 elts) Min $=[0,3,4,7] \quad$ Max $=[8,11,12,15]$
Allen* Min $=$ finished_by $[0,3,4,7], \operatorname{Max}=$ finished_by $[8,11,12,15]$
----------------
subset x meets ->
Allen* relations : 80 elts
meets (80 elts) $\quad \operatorname{Min}=[0,1,2,5] \quad \operatorname{Max}=[8,9,12,13]$
met_by (5 elts) $\quad \operatorname{Min}=[3,5,7,9][3,4,7,8] \quad \operatorname{Max}=[7,9,11,13][11,14,15,16]$
overlapped_by (5 elts) $\quad \operatorname{Min}=[2,5,6,9][2,4,6,8] \quad$ Max $=[6,9,10,13][10,14,14,16]$
Allen* Min ${ }^{-}=$meets $[0,1,2,5], \operatorname{Max}=\operatorname{meets}[8,9,12,13]$
subset x met by ->
Allen* relations : 80 elts
meets (5 elts) $\quad \operatorname{Min}=[3,5,7,9][0,1,2,5] \quad \operatorname{Max}=[7,9,11,13][8,9,12,13]$
met_by (80 elts) $\quad \operatorname{Min}=[3,4,7,8] \quad$ Max $=[11,14,15,16]$
overlaps (5 elts) $\quad \operatorname{Min}=[3,6,7,10][0,2,2,6] \quad \operatorname{Max}=[7,10,11,14][8,10,12,14]$
Allen* Min $=$ met_by $[3,4,7,8], \operatorname{Max}=\operatorname{met}$ by $[11,14,15,16]$
subset x overlaps ->
Allen* relations : 80 elts
met_by (5 elts) Min = [3,6,7,10] [3,4,7,8] Max = [7,10,11,14][11,14,15,16]
overlaps (80 elts) $\quad \operatorname{Min}=[0,2,2,6] \quad \operatorname{Max}=[8,10,12,14]$
overlapped_by (5 elts) $\quad \operatorname{Min}=[2,6,6,10][2,4,6,8] \quad \operatorname{Max}=[6,10,10,14][10,14,14,16]$
Allen* Min $=$ overlaps $[0,2,2,6]$, Max $=$ overlaps $[8,10,12,14]$
subset x overlapped_by ->
Allen* relations : $\overline{80}$ elts
meets (5 elts) $\quad \operatorname{Min}=[2,5,6,9][0,1,2,5] \quad \operatorname{Max}=[6,9,10,13][8,9,12,13]$
overlaps (5 elts) $\quad \operatorname{Min}=[2,6,6,10][0,2,2,6] \quad \operatorname{Max}=[6,10,10,14][8,10,12,14]$
overlapped_by ( 80 elts) $\quad \operatorname{Min}=[2,4,6,8] \quad \operatorname{Max}=[10,14,14,16]$
Allen* Min = overlapped_by [2,4,6,8] , Max = overlapped_by [10,14,14,16]
subset x during ->
Allen* relations : 6 elts
during (6 elts) $\quad$ Min $=[2,2,6,6] \quad$ Max $=[10,10,14,14]$
Allen* Min $=$ during $[2,2,6,6]$, Max $=$ during $[10,10,14,14]$
subset x contains ->
Allen* relations : 56 elts
contains (56 elts) $\quad \operatorname{Min}=[0,4,4,8] \quad$ Max $=[8,12,12,16]$
Allen* Min $=$ contains $[0,4,4,8]$, Max $=$ contains $[8,12,12,16]$
subset $x$ subset ->
Allen* relations : 6 elts

