GAC Example

Consider the following CSP:

$$Dom[X] = \{1, 2, 3, 4\} \qquad Dom[Y] = \{1, 2, 3, 4\}$$
$$Dom[Z] = \{1, 2, 3, 4\} \qquad Dom[W] = \{1, 2, 3, 4, 5\}$$
$$C_1(X, Y, Z) : X = Y + Z$$
$$C_2(X, W) : W > X$$
$$C_3(X, Y, Z, W) : W = X + Z + Y$$

Enforce GAC on these constraints, and give the resultant GAC consistent variable domains.

$CurDom[X] = \{1, 2, 3, 4\}$ $CurDom[Y] = \{1, 2, 3, 4\}$

$CurDom[Z] = \{1, 2, 3, 4\}$ $CurDom[W] = \{1, 2, 3, 4, 5\}$

$C_1(X, Y, Z) : X = Y + Z$

$C_2(X, W) : W > X$

$C_3(X, Y, Z, W) : W = X + Z + Y$

- Processing C_3:

.

$$CurDom[X] = \{1, 2, 3\} \qquad CurDom[Y] = \{1, 2, 3\}$$
$$CurDom[Z] = \{1, 2, 3\} \qquad CurDom[W] = \{3, 4, 5\}$$

$$C_1(X, Y, Z) : X = Y + Z$$
$$C_2(X, W) : W > X$$
$$C_3(X, Y, Z, W) : W = X + Z + Y$$

- Processing C_2:

.

$$CurDom[X] = \{1, 2, 3\} \qquad CurDom[Y] = \{1, 2, 3\}$$
$$CurDom[Z] = \{1, 2, 3\} \qquad CurDom[W] = \{3, 4, 5\}$$

$$C_1(X, Y, Z) : X = Y + Z$$
$$C_2(X, W) : W > X$$
$$C_3(X, Y, Z, W) : W = X + Z + Y$$

- Processing C_1:

.

$CurDom[X] = \{2, 3\}$ $CurDom[Y] = \{1, 2\}$

$CurDom[Z] = \{1, 2\}$ $CurDom[W] = \{3, 4, 5\}$

$C_1(X, Y, Z) : X = Y + Z$

$C_2(X, W) : W > X$

$C_3(X, Y, Z, W) : W = X + Z + Y$

- Processing C_3:

.

$$CurDom[X] = \{2, 3\} \qquad CurDom[Y] = \{1, 2\}$$
$$CurDom[Z] = \{1, 2\} \qquad CurDom[W] = \{4, 5\}$$

$$C_1(X, Y, Z) : X = Y + Z$$
$$C_2(X, W) : W > X$$
$$C_3(X, Y, Z, W) : W = X + Z + Y$$

- Processing C_2:

.

$$CurDom[X] = \{2, 3\} \qquad CurDom[Y] = \{1, 2\}$$
$$CurDom[Z] = \{1, 2\} \qquad CurDom[W] = \{4, 5\}$$

$$C_1(X, Y, Z) : X = Y + Z$$
$$C_2(X, W) : W > X$$
$$C_3(X, Y, Z, W) : W = X + Z + Y$$

- Branch on X:
  $X = 2$

$$CurDom[X] = \{2, 3\} \qquad CurDom[Y] = \{1, 2\}$$
$$CurDom[Z] = \{1, 2\} \qquad CurDom[W] = \{4, 5\}$$

$$C_1(X, Y, Z) : X = Y + Z$$
$$C_2(X, W) : W > X$$
$$C_3(X, Y, Z, W) : W = X + Z + Y$$

- Branch on X:
  $X = 3$

.

GAC Example

C1(V1,V2,V3)

V1	V2	V3
A	B	C
B	A	C
A	A	B

C2(V1,V3,V4,V5)

V1	V3	V4	V5
A	A	A	A
A	B	C	B
B	C	B	B
C	A	B	C
C	B	A	B

C3(V2,V3,V5)

V2	V3	V5
A	A	A
A	B	C
B	C	B
C	A	B
C	B	A

C1(V1,V2,V3)

V1	V2	V3
A	B	C
B	A	C
A	A	B

C2(V1,V3,V4,V5)

V1	V3	V4	V5
A	A	A	A
A	B	C	B
B	C	B	B
C	A	B	C
C	B	A	B

C3(V2,V3,V5)

V2	V3	V5
A	A	A
A	B	C
B	C	B
C	A	B
C	B	A

C1(V1,V2,V3)

V1	V2	V3
A	B	C
B	A	C
A	A	B

C2(V1,V3,V4,V5)

V1	V3	V4	V5
A	A	A	A
A	B	C	B
B	C	B	B
C	A	B	C
C	B	A	B

C3(V2,V3,V5)

V2	V3	V5
A	A	A
A	B	C
B	C	B
C	A	B
C	B	A

C1(V1,V2,V3)

V1	V2	V3
A	B	C
B	A	C
A	A	B

C2(V1,V3,V4,V5)

V1	V3	V4	V5
A	A	A	A
A	B	C	B
B	C	B	B
C	A	B	C
C	B	A	B

C3(V2,V3,V5)

V2	V3	V5
A	A	A
A	B	C
B	C	B
C	A	B
C	B	A

C1(V1,V2,V3)

V1	V2	V3
A	B	C
B	A	C
A	A	B

C2(V1,V3,V4,V5)

V1	V3	V4	V5
A	A	A	A
A	B	C	B
B	C	B	B
C	A	B	C
C	B	A	B

C3(V2,V3,V5)

V2	V3	V5
A	A	A
A	B	C
B	C	B
C	A	B
C	B	A

C1(V1,V2,V3)

V1	V2	V3
A	B	C
B	A	C
A	A	B

C2(V1,V3,V4,V5)

V1	V3	V4	V5
A	A	A	A
A	B	C	B
B	C	B	B
C	A	B	C
C	B	A	B

C3(V2,V3,V5)

V2	V3	V5
A	A	A
A	B	C
B	C	B
C	A	B
C	B	A

C1(V1,V2,V3)

V1	V2	V3
A	B	C
B	A	C
A	A	B

C2(V1,V3,V4,V5)

V1	V3	V4	V5
A	A	A	A
A	B	C	B
B	C	B	B
C	A	B	C
C	B	A	B

C3(V2,V3,V5)

V2	V3	V5
A	A	A
A	B	C
B	C	B
C	A	B
C	B	A

C1(V1,V2,V3)

V1	V2	V3
A	B	C
B	A	C
A	A	B

C2(V1,V3,V4,V5)

V1	V3	V4	V5
A	A	A	A
A	B	C	B
B	C	B	B
C	A	B	C
C	B	A	B

C3(V2,V3,V5)

V2	V3	V5
A	A	A
A	B	C
B	C	B
C	A	B
C	B	A