In the rest of this chapter (and in Chapter 5), we illustrate queries using the instances $S3$ of Sailors, $R2$ of Reserves, and $B1$ of Boats, shown in Figures 4.15, 4.16, and 4.17, respectively.

sid	*sname*	*rating*	*age*
22	Dustin	7	45.0
29	Brutus	1	33.0
31	Lubber	8	55.5
32	Andy	8	25.5
58	Rusty	10	35.0
64	Horatio	7	35.0
71	Zorba	10	16.0
74	Horatio	9	35.0
85	Art	3	25.5
95	Bob	3	63.5

Figure 4.15 An Instance $S3$ of Sailors

sid	*bid*	*day*
22	101	10/10/98
22	102	10/10/98
22	103	10/8/98
22	104	10/7/98
31	102	11/10/98
31	103	11/6/98
31	104	11/12/98
64	101	9/5/98
64	102	9/8/98
74	103	9/8/98

Figure 4.16 An Instance $R2$ of Reserves

bid	*bname*	*color*
101	Interlake	blue
102	Interlake	red
103	Clipper	green
104	Marine	red

Figure 4.17 An Instance $B1$ of Boats

`Find the names of sailors who have reserved boat 103.`

$$\pi_{sname}((\sigma_{bid=103} Reserves) \bowtie Sailors)$$

`Find the names of sailors who have reserved a red boat.`

$$\pi_{sname}((\sigma_{color='red'} Boats) \bowtie Reserves \bowtie Sailors)$$

Find the colors of boats reserved by Lubber.

$$\pi_{color}((\sigma_{sname='Lubber'}Sailors) \bowtie Reserves \bowtie Boats)$$

Find the names of sailors who have reserved at least one boat.

$$\pi_{sname}(Sailors \bowtie Reserves)$$

Find the names of sailors who have reserved a red or a green boat.

$$\rho(Tempboats, (\sigma_{color='red'}Boats) \cup (\sigma_{color='green'}Boats))$$
$$\pi_{sname}(Tempboats \bowtie Reserves \bowtie Sailors)$$

Find the names of sailors who have reserved a red and a green boat.

$$\rho(Tempred, \pi_{sid}((\sigma_{color='red'}Boats) \bowtie Reserves))$$
$$\rho(Tempgreen, \pi_{sid}((\sigma_{color='green'}Boats) \bowtie Reserves))$$
$$\pi_{sname}((Tempred \cap Tempgreen) \bowtie Sailors)$$

Find the sids of sailors with age over 20 who have not reserved a red boat.

$$\pi_{sid}(\sigma_{age>20}Sailors) -$$
$$\pi_{sid}((\sigma_{color='red'}Boats) \bowtie Reserves \bowtie Sailors)$$

`Find the names of sailors who have reserved all boats.`

$$\rho(Tempsids, (\pi_{sid,bid}Reserves)/(\pi_{bid}Boats))$$
$$\pi_{sname}(Tempsids \bowtie Sailors)$$

`Find the names of sailors who have reserved all boats called Interlake.`

$$\rho(Tempsids, (\pi_{sid,bid}Reserves)/(\pi_{bid}(\sigma_{bname='Interlake'}Boats)))$$
$$\pi_{sname}(Tempsids \bowtie Sailors)$$

`Find the names of sailors who have reserved at least two boats.`

$$\rho(Reservations, \pi_{sid,sname,bid}(Sailors \bowtie Reserves))$$
$$\rho(Reservationpairs(1 \to sid1, 2 \to sname1, 3 \to bid1, 4 \to sid2,$$
$$5 \to sname2, 6 \to bid2), Reservations \times Reservations)$$
$$\pi_{sname1}\sigma_{(sid1=sid2)\wedge(bid1\neq bid2)}Reservationpairs$$