if the resource database contains *C* then allocate *C* to
the *task*;

otherwise create a subgoal to achieve resource *C* by time
s, and with other constraints such as quality similar to
those imposed on the top-level goal.

Next, recursively invoke the planner to achieve the new
subgoal *C*, and append the two outputs of the planner
respectively to the sets *output-tasks* and *output-subgoals*.

If the no task can be found to achieve the resource *R* within the time,
resource and other constraints, append the goal to achieve R to the
set *output-subgoals* and return.

The computation of the total cost of achieving a goal is taken as the sum
of the cost of performing all the task required to attain the goal.

Once planning has taken place, the planner *tentatively* books the planned
schedule into the commitment table. On receipt of a confirmation of the booking
from the coordination engine, the schedule will be *firmly* booked and the tasks
made ready for execution at their scheduled times. This use of tentative and firm
booking gives the coordination engine time to delegate external subgoals required
to achieve a goal, and also the ability to cancel commitments.

The behaviour of the CABS agent planner introduces the following
particularly useful concepts:

• the use of *tentative* and *firm* bookings gives the planner the ability to double-
book already tentatively booked slots (similar in principle to what airline
reservation companies do). This idea improves the agent's chances of operating
at full capacity. The mechanism for handling double-booking operates as
follows: The planner maintains a second copy of the commitment table which
records only the firmly booked slots and double-booked tentatively booked slots.
If double-booking is allowed by the agent, the planner uses this table in planning
when it cannot find free slots for a task using the normal commitment table.   If
free slots are found on the second table, then those slots are marked as double-
booked.   In the current implementation, when two goals are booked on the
same slots, the first goal to be confirmed gets allocated the slots and the