departure process in a queue

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From: ZHANG Yan (*buaanupt_at_sina.com*)
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I have a question about the departure process in the queueing theory.

The arrival process is Poisson process. The service time is exponential distribution. There are C servers. At the time of a customer arrivval, if there are free server, the customer will occupy one server. If all servers are occupied, the customer will join a finite FIFO queue with length N. If no server is avaiable and the queue is full, the customer is blocked. When a server is released due to service completion, the server will first check the queue. If the queue is not empty, the customer at the head of the queue will use this server.

The questions are:

1. for the process of successfully completed service customers, how to model this process? Is this still Poisson or Interrupted Poisson or MMPP?
2. if the service time follows other distribution, e.g. erlang distribution, then how to model the departure process?

Any suggestions are greatly appreciated. Thank you very much for comments.

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ZHANG Yan