##### InterCat

Introduction

Janet Richards takes deep breath and says firmly, “Alright. Let’s do it.” And with those words, the founder of InterCat, a firm that specialises in the design and maintenance of Internet catalogues for small consumer businesses, agrees with her CFO’s proposal to go public.

InterCat now counts 30 employees, with the majority of them computer programmers and analysts. Many of the employees have followed the high-technology market very closely and have decided that since high-tech firms are more understood and valued in the United States than in other countries, InterCat should issue its stock only in the United States. The first issue will comprise five million shares of InterCat stock.

The IPO Project

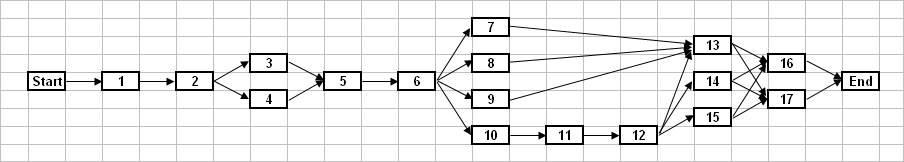
The task the company has ahead of itself is certainly daunting. Janet and Gilbert Keith (the company’s CFO) know that many steps have to be completed in the process of making an initial public offering (IPO). They also know that they need to complete the process as soon as possible because they need the new capital fairly soon to ensure that InterCat has the resources to capture valuable new business from its competitors and continue growing. They also value a speedy IPO because they believe that despite the recent slump in tech stocks, there still is a good opportunity for obtaining a good stock price.

Based on what he remembers from the Project Management elective he took in his second year MBA, Gilbert decides to map the steps in the process of making an IPO. Janet and Gilbert list each major activity that needs to be completed and the interrelationships between the various activities. They list, for each activity, on which other activities it depends, in the sense that it can only be executed when all of these predecessor activities have been completed. They also list an estimate for the time needed to complete each activity, and its estimated cost. The list is shown in the table below.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Activity (short name in capitals)** | **Preceding Activities** | **Time (weeks)** | **Cost (£)** |
| 1 | **Evaluate** the prestige of potential **underwriters** |  | 3 | 8,000 |
| 2 | **Select** a **syndicate** of underwriters | * Evaluate the prestige of potential underwriters | 1.5 | 4,500 |
| 3 | **Negotiate** the **commitment** of the syndicate members | * Select a syndicate of underwriters | 2 | 9,000 |
| 4 | **Negotiate** the **spread**[[1]](#footnote-1)\* of the syndicate members | * Select a syndicate of underwriters | 3 | 12,000 |
| 5 | **Prepare** the **registration statement** including the proposed financing and information about the firm’s history, existing business, and plans for the future | Negotiate ***both*** the commitment and spread for the syndicate members | 5 | 50,000 |
| 6 | **Submit** the **registration** **statement** to the Securities and Exchange Commission (SEC) | * Prepare the registration statement | 1 | 1,000 |
| 7 | **Make presentations** to institutional investors and develop the interest of potential buyers | * Submit the registration statement to the SEC | 6 | 25,000 |
| 8 | **Distribute** the **preliminary prospectus**, affectionately termed the red herring | * Submit the registration statement to the SEC | 3 | 15,000 |
| 9 | **Calculate** the **issue price** | * Submit the registration statement to the SEC | 5 | 12,000 |
| 10 | **Receive deficiency memorandum** from the SEC | * Submit the registration statement to the SEC | 3 | 0 |
| 11 | **Amend** the **registration** **statement** and resubmit it to the SEC | * Receive deficiency memorandum for the SEC | 1 | 6,000 |
| 12 | **Receive registration confirmation** from the SEC | * Amend the registration statement and resubmit it to the SEC | 2 | 0 |
| 13 | **Confirm** that the new **issue** **complies** **with** the **“blue sky” laws** of each state | * Make presentations to institutional investors and develop the interest of potential buyers; * Distribute the preliminary prospectus, affectionately termed the red herring; * Calculate the issue price; * Receive registration confirmation from the SEC | 1 | 5,000 |
| 14 | **Appoint** a **registrar** | * Receive registration confirmation from the SEC | 3 | 12,000 |
| 15 | **Appoint** a **transfer** **agent** | * Receive registration confirmation from the SEC | 3.5 | 13,000 |
| 16 | **Issue** the **final** **prospectus** including the final offer price | * Confirm that the new issue complies with the “blue sky” laws of each state; * Appoint a registrar ***and*** transfer agent | 5 | 40,000 |
| 17 | **Phone** **interested** **buyers** | * Confirm that the new issue complies with the “blue sky” laws of each state; * Appoint a registrar ***and*** transfer agent | 4 | 9,000 |

The Analysis

1. Draw a Network Diagram for completing the initial public offering of InterCat stock.



1. Using CPM, determine the minimum time needed for the initial public offering process. What are the critical steps in the process? Which activities have some slack? What is the total project cost?

CPM can be either done on the project network diagram or in a purpose-built Excel spreadsheet. The CPM should provide us with the early start, early finish, late start and late finish for each activity. Using that information, we can then find the critical path, as well as the total and free slack for each activity.

**The total project duration is 28 weeks.**

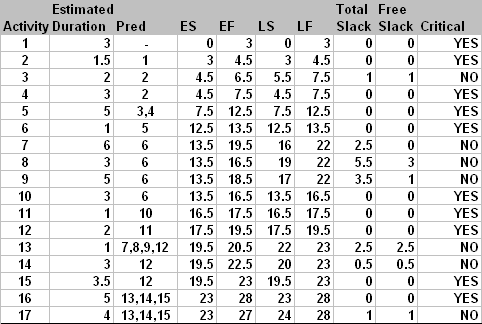
The **critical path** contains the following activities:

**1 – 2 – 4 – 5 – 6 – 10 – 11 – 12 – 15 – 16**

A delay in these activities will result in a delay of the IPO, and thus these activities need to be closely monitored during the project execution to ensure that they are not slipping behind schedule and endangering the announced IPO date.

All the non-critical activities have a positive total slack, which means that they can be delayed without delaying the IPO date. Except for activity 7, all the non-critical activities also have a free slack (albeit sometimes smaller than the corresponding total slack). Activity 7 has a free slack of 0, which means that delaying activity 7 will have an immediate impact on (at least) one of its successors. Since activity 7 has a positive total slack, this will not lead to a delay in the IPO date as long as the delay is less than the total slack.

As mentioned before, the **total cost** is the sum of the individual activity costs, i.e. **$221,500**.



1. Janet and Gilbert also want to carry out a sensitivity analysis in order to examine how possible unexpected changes would affect the project schedule. Therefore, investigate how the following changes would affect the time to complete the IPO (and interpret the effect of the changes). As is customary in a sensitivity analysis, evaluate each change independently:

* Suppose the SEC finds many deficiencies in the initial registration statement, and we should expect the underwriters to spend 2.5 weeks amending the statement and resubmitting it to the SEC instead of just 1 week.

Activity 11 is a **critical** activity. Lengthening that activity will translate in an equivalently longer total project duration. The **project duration** increases to **29.5**. The critical path does not change.

* Suppose the underwriters are truly math geniuses, and we overestimated the time it takes to calculate the issue price by 1 week.

Activity 9 is **not critical**. Therefore reducing its duration will **not have an impact on the total project duration**, and neither will the critical path change.

* Suppose some members of the syndicate are playing hardball. In that case, we may have to increase the time it takes to negotiate the commitment of the syndicate members from 2 to 3 weeks.

Activity 3 has a **total slack of 1 week**. If we increase its duration by 1 week, there will therefore be **no change in the total project duration**. However, the critical path will change, and now includes activity 3 as well as the previously critical activities.

* Suppose that the new issue does not comply with the “blue sky” laws of a handful of states, and that it takes 4 weeks instead of just 1 to edit the issue for each state to ensure compliance.

Activity 13 is not critical; however, its total slack is only 2.5 weeks, and an increase in duration from 1 week to 4 weeks goes beyond the available total slack. Therefore the **project duration** will increase to **28.5**, and the critical path will change. The new critical path includes the following activities:

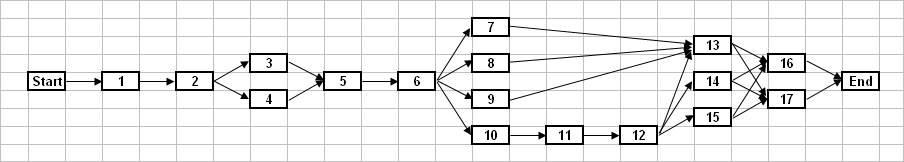
**1 – 2 – 4 – 5 – 6 – 7 – 10 – 11 – 12 – 13 – 16**

* Suppose the spread negotiation phase can be reduced to 2, or even 1 week if Janet and Gilbert are a little more lenient.

Activity 4 is a **critical activity**, and a reduction in its duration will result in a reduction of the total project duration. Reducing Activity 4 by one week results in a **project duration** of **27 weeks**, and changes the critical path to include Activity 3.

A further reduction in the duration of Activity 4 will not result in an equivalent decrease in the project duration as Activity 3 is now critical, and Activity 4 simply becomes non-critical, with a total and free slack of 1 week.

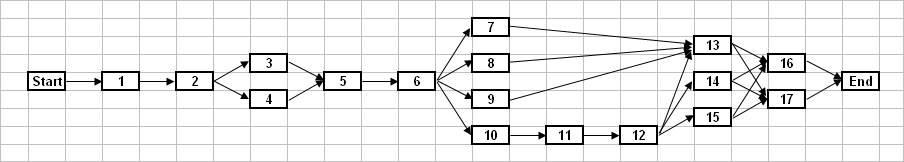
1. Write the LP.



D.V.: : start time of activity *i*

Parameter: : duration of activity *i*

1. Crashing



D.V.: : start time of activity *i*

: decision to crash (or not)

Parameter: : duration of activity *i*

**Optimal solution (binary crashing):**

Crash activities: **1, 2, 14, 15, 16, 17** at a cost of **$316,000**. You finish in exactly 22 weeks.

**Optimal solution (fractional crashing):**

Same!

1. \* The spread is the payment an underwriter receives for his services [↑](#footnote-ref-1)