CS207 #9, 22 Nov 2013

Gio Wiederhold
Hewlett 102

The advertising icon for CS207
Syllabus:

1. Why should software be valued?
3. Market value of software companies.
4. Intellectual capital and property (IP).
5. The role of patents, copyrights, and trade secrets.
7. Life and lag of software innovation.
8. Sales expectations and discounting, Licensing.
10. Separation of use rights from the property itself.
11. Risks when outsourcing and offshoring development.
12. Effects of using taxhavens to house IP. IP transfer.
13. IP flow, Abolish Corporate tax. Advertising, Money,
Report notes

• Always date your work. *If it’s on-line it will stay around forever and you don’t want to be embarrassed 10 years later.*

• Few had abstracts; objective statement; (decompose); conclusion
  ➢ Good for your organization to state the objective. Have only one in a paper!
  ➢ Good to get on-line readers to go *below the fold*

• If you cite web references, keep a copy on your files. *Web pages may disappear or be changed.*

• I also mark writing, although that is not a CS207 objective *(CS73N =WR2)*

• When you mail something out, include your name in addition to the course in the file name. *Makes it easier for the recipient who gets a bunch of ‘CS207report’ files*

Offshoring

Task transfer to Enterprises in Foreign countries

Two aspects:

1. Work migration: jobs are moved to lower-cost countries
2. Support software etc. is moved to enable similar productivity in those countries

Income is generated by people and (intellectual) capital
Hypothesis

- Offshoring of jobs is effective because of concurrent Intellectual Property (IP) transfer
- Much of that IP is corporate property
- Transfer of corporate IP & IP rights is poorly understood
  - IP as property is not well defined, hard to measure
  - There are many components to IP, coming from
    - open source, R&D, marketing, reputation as
    - Patents, copyright, trade secret (covered by NDAs)
- Even if hard to value, IP & IP rights is a significant export
Types of Foreign Entities

- **Independent Foreign Contractors**
  - IFC may serve multiple customers
    - Share trade secrets with competitors
  - Owners need contracts to protect the IP
    - Hard to monitor and enforce

- **Owned, Controlled Foreign Corporations**
  - CFC provides much more control over IP
  - Ownership often in third-party countries
    - Avoids *taxation* of sales to other countries
Knowledge is the Link

To be effective a worker has to know what has to be done

- That knowledge consists of
  - The technology
    - Documentation, prior versions, quality control
  - The business methods
    - How technology in the product is marketed
    - The flow from buyers to improved products and methods
- Companies distinguish themselves by proprietary IP
  1. Patents, sometimes Copyrights
  2. Confidential Documents
  3. Knowledge within its people - protected by NDAs
Income flow without taxhaven

Manufacturing

Booking of sales

Income from sales

MNC

EMEA distributor and adapter

PFE distributor

LSA distributor

Taxable income
Taxhavens

Places where

1. Taxes are low
2. Financial and IP supervision is minimal
3. Reporting requirements are minimal

• Three **cooperating types are needed**

  1. **Primary tax havens** (about a dozen countries)
     - Small populations,
     - Can live largely of license fees
       - Cayman Islands: pop. 50K, 90K companies @ 3000/year
  2. **Semi-taxhavens** (more, but diverse)
     - Large populations, need jobs
     - Enact, often temporary, tax benefits for foreign work
  3. **Conduit taxhavens** (few, small, financially active countries)
     - trusted, separate taxhaven activities by *ringfencing*
     - can shuffle funds invisible among locations
Internal sale for intangibles

Procedure functionally identical to tangible example, but

• Even less visible
  ▪ IP transactions are harder to value than buildings
• IP is a much larger fraction of corporate value than HQ
• The consumers of the IP are the sales organizations
  ▪ Not the tenants
• Typically involves three or more entities
  1. Parent company, creator, or sponsor
     ▪ Creates and maintains the IP
  2. IP holding company, often in a tax haven
     ▪ Buys IP initially and pays for its maintenance. Licenses its use.
  3. IP consumer: selling company
     ▪ Buys license to use the IP in products it sells, pays royalty to IP holder
  4. Off shore IP generators
Income flow with 3 flavors of taxhavens

- Shell IP holding
- Financial intermediary
- Offshore manufacturing

Manufacturing
- Booking of sales
- Income from sales to taxhaven
Flow

Semi-taxhaven

IP documents and knowhow

Product for US customers

Product for RoW customers

Product cost

Sales

IP rights

MNC
California

Conduit
Holland

Primary
Palm Island

Malaysia, India

MNC
California

Conduit
Holland

Primary
Palm Island
<table>
<thead>
<tr>
<th>Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Parent:</strong> MNC</td>
</tr>
<tr>
<td><strong>CFH:</strong> CONCH</td>
</tr>
<tr>
<td><strong>CFI:</strong> CAAS</td>
</tr>
<tr>
<td><strong>Semi-</strong></td>
</tr>
<tr>
<td><strong>CFCs:</strong> MNC JB, MNC MY</td>
</tr>
<tr>
<td><strong>Set Up:</strong></td>
</tr>
<tr>
<td><strong>Control:</strong></td>
</tr>
<tr>
<td><strong>Own:</strong></td>
</tr>
<tr>
<td><strong>Primary:</strong></td>
</tr>
<tr>
<td><strong>Advisor:</strong> ATA</td>
</tr>
<tr>
<td><strong>Conduit:</strong></td>
</tr>
</tbody>
</table>

- MNC California
- Malaysia, India + Holland + Palm Island

### Parent: MNC
- **CFH:** CONCH
- **CFI:** CAAS
- **CFCs:** MNC JB, MNC MY

### Semi-
- MNC JB, MNC MY

### Control
- MNC

### Own
- MNC JB, MNC MY

### Primary
- CONCH

### Advisor
- ATA

### Conduit
- $₹€£¥
Forest Labs flow
[from Business Week 14 May 2010]

0. Initial transaction: IP rights transfer to Bermuda

IP RIGHTS

Forest Labs Research, St. Louis, MO

FLR

IP value?

FRX

$99

$76

$5

$7

$2.38 US taxes for public use

$50 available for new investment?

$12 IP license

$64

Cost $5

$45 profit, after tax+ overhead potentially US taxable

FLH

FFBV

($17+0.11 Irish tax)

1. Phoenix
Tyler Hurst purchases a prescription of Lexapro for $99 at a Phoenix Walgreens. The money heads east.

2. New York
Forest Laboratories, the maker of Lexapro, is headquartered in New York City. While all of the company’s sales of Lexapro are in the U.S., most of the profits end up with an Irish subsidiary. The pills are purchased from the Irish subsidiary and distributed throughout the U.S.

3. Dublin
A subsidiary called Forest Laboratories Ireland manufactures and sells Lexapro to its U.S. parent. This lets Forest legally shift most profits from the U.S. to Ireland, avoiding a 35 percent U.S. corporate income tax. To reduce its tax bill even further, the manufacturing unit’s corporate cousin, Forest Laboratories Holdings, registered an office in Hamilton, Bermuda, declaring the island its tax residence.

4. Amsterdam
Forest avoids a 20 percent Irish withholding tax on payments it sends to Bermuda by first paying another subsidiary, Forest Finance in the Netherlands. Forest Finance then pays the office in Bermuda. By going to another European Union member state first, the withholding tax is avoided.

5. Bermuda
An Irish manufacturing unit of Forest pays the Bermuda office to sublicense Lexapro’s patents. Those payments move the taxable profits out of Ireland and into Bermuda. This maneuver helped cut Forest’s Irish income tax rate from 10.3 percent the year before to 2.4 percent the year after.

Bottom Line
Tax dollars that could be paid to the U.S. on profits generated by a product sold entirely in the U.S. are significantly reduced. Income taxes in Ireland are largely avoided. Technically, the U.S. taxes are deferred, bringing the offshore profits back home to the U.S. But American companies rarely repatriate significant portions of that income.
With Taxhavens: Three-party flow

**Parent corporation**
- Salaries
- License fees
- Initial purchase

**Sub corporation “CFH”**
- Purchased the rights to

**Offshore job sites**
- Integration
- IP documentation
- High-value Products

**Know How of the workforce**

**Rights to the Intellectual Property**

**non-routine profits**

*Initial purchase*  
*License fees*  
*Salaries*
Capital and IP creates more IP and Income

Capital & IP at source

Income

Capital and IP in CFH

Income
Apple paid less than 2% corporation tax on its profits outside the US, its filing with US regulators has shown.

The company paid $713m in the year to 29 September on foreign pre-tax profits of $36.8bn, 1.9%.

It is the latest company to be identified as paying low rates of overseas tax, following Starbucks, Facebook and Google in recent weeks.

It has not been suggested that any of their tax avoidance schemes are illegal.

All of the companies pay considerable amounts of other taxes in the UK, such as National Insurance, and raise large sums of VAT.

Apple's figures for foreign tax appear on page 61 of its form 10-K filing with the US Securities and Exchange Commission (SEC). The form is used to summarise the performance of public companies.

It had paid a rate of 2.5% the previous year.

Apple channels much of its business in Europe through a subsidiary in the Republic of Ireland, which has lower corporation tax than Britain.

But even Ireland charges 12.5%, compared with Britain's 24%.

Many multinational companies manage to pay substantially below the official corporation tax rates by using tax havens such as Caribbean islands. http://www.bbc.co.uk/news/business-20197710
Capital flow with a taxhaven

Source
IP Creator

Income
Capital

Tangibles are harder to move than IP

Controlled Foreign Holding Company

CFH

Buy-in

License

Income

CFC
IP consumer

Tax havens:
Capital and IP
Vanuatu
Cayman islands
Barbados

Fees

Royalties

US taxes

Foreign taxes
Job Flow @ different levels of personnel

Parent ————————→ CFC
Is knowledge transmitted from the top or acquired from experience at the bottom?
Longer term effect

- Repatriation of $$ from the CFH to the US is taxed.
- Current workers are paid by the CFH. US and offshore employees are unaware of the source of their paycheck
  - The CFH acquires an increasing fraction of the IP
  - The CFH is paid an increasing fraction of the income
  - The CFH in time can becomes richer than the company.
- It is more efficient for the company to invest in low-tax countries and create jobs there.
  - Job losses in the U.S. increase
- Eventually the CFH can buy the parent company.
  - Control by stockholders is gone as well
Effects over time

- **Initial IP transfer**
  - $ for divi
    - ends
  - $ for initial IP

- **Taxing country**
  - IP at the parent corporation
  - $ for ta
    - xes

- **IP held at the CFH**
  - Right to use the IP

- **Primary taxhaven**
  - IP available for more new projects
  - $ available for more new projects
  - new $

- **Profit share for parent**

- **Profit share for CFH**
  - all untaxed

- **New projects in semi-taxhavens/low cost countries**
  - New profits only for CFH

- **Time**
Own vs. Rent:
The dynamics of sharing

Dr. Vishal Sikka
Member of the Executive Board  |  SAP AG
November 22, 2013
Recap from our last lecture

We are exploring fundamental tradeoff decisions that impact software development as well as areas beyond software.

These tradeoffs are:
- Renovating vs. Reconstruction \( \rightarrow \) covered in last lecture
- Own vs. Rent
- Build to Stock vs. Make to Order

Today we look at the economics and tradeoffs associated with owning vs. renting a resource.
Fundamental question for our discussion today

At which point does it make sense to have a resource be dedicated vs. have it be shared and what are the fundamental principles at work here? A corollary to this is own vs. rent or the essential dynamics of the own-share spectrum.

The above question applies to software as well as physical goods and services
### Increasing interest in rental model (1/2)

<table>
<thead>
<tr>
<th>Transportation</th>
<th>Hospitality</th>
<th>Infrastructure</th>
<th>Products &amp; Apparel</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="logo_zipcar.png" alt="Zipcar" /></td>
<td><img src="logo_airbnb.png" alt="Airbnb" /></td>
<td><img src="logo_aws.png" alt="Amazon Web Services" /></td>
<td><img src="logo_renttherunway.png" alt="Rent the Runway" /></td>
</tr>
</tbody>
</table>

#### Transportation
- Since its founding in 2000, grown over 850,000 members
- ~11,000 vehicles across US, Canada, UK, Spain, Austria
- 2012 Revenue: $278.9M. Two tier structure – annual membership ($60/yr), hourly rental ($8-$10/hr)

#### Hospitality
- 10M nights booked since its founding in 2008—4M in just first half 2012
- Over 500,000 listings in 34,000 cities in 192 countries
- Over 32 languages supported, more than 1.5M app store downloads. Charges 9 – 12% on each booking

#### Infrastructure
- Launched in 2006, customers in 190 countries, including Pinterest, Dropbox, as well as Netflix, Shell, Adobe, 300 govt. agencies worldwide
- Data centers in 9 regions, 25 availability zones and 38 edge locations for content distribution
- Revenues expected ~$1B in Q4 2013, over $3.2B in 2013

#### Products & Apparel
- Launched in 2009, customers in 190 countries, including Pinterest, Dropbox, as well as Netflix, Shell, Adobe, 300 govt. agencies worldwide
- Offers 25,000 dresses from over 150 designers
- Rental costs $75 to $200 per dress (2-4 days) plus $5 for insurance

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*On 14 March 2013 Avis Budget Group purchased Zipcar for about US$500 million in cash

^ Estimated as Amazon does not split out the revenues for AWS but bundles it in the other category*
Increasing interest in rental model (2/2)

Decided to switch to pure SaaS model in 2004. In 3 years, moved to new model from its existing traditional license based business model, subscription revenues now match up to the original license revenues.

In May 2012 announced Creative Cloud offering but still maintained its license model. In May 2013 announced no current plans to release another perpetual release of the packaged software. Creative Cloud to be sole delivery option.

Pursuing a dual strategy for its biggest revenue and profitable segment, MS Office. Mix of subscription based Office 365 offering and ownership based license model.
An example of rental model adoption: Adobe creative subscription momentum

Creative cloud subscriptions

Business model transition significantly increases long-term revenue growth

<table>
<thead>
<tr>
<th>Metric</th>
<th>Q3 FY12</th>
<th>Q4 FY 12</th>
<th>Q1 FY 13</th>
<th>Q2 FY 13</th>
<th>Q3 FY 13</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total paid subscriptions exiting the quarter</td>
<td>194K</td>
<td>326k</td>
<td>479k</td>
<td>700k</td>
<td>1,031k</td>
</tr>
<tr>
<td>% with annual commitment (vs. month-to-month)</td>
<td>88%</td>
<td>90%</td>
<td>92%</td>
<td>93%</td>
<td>95%</td>
</tr>
<tr>
<td>% full creative cloud (vs. point products)</td>
<td>79%</td>
<td>81%</td>
<td>81%</td>
<td>81%</td>
<td>81%</td>
</tr>
<tr>
<td>Creative annualized recurring revenue (Mn)</td>
<td>$90</td>
<td>$153</td>
<td>$233</td>
<td>$355</td>
<td>$546</td>
</tr>
</tbody>
</table>

Key takeaways:
- Increase/acceleration in creative cloud subscriptions
- Traditional perpetual license revenues declines (yoy basis). Expenses did not/not expected to decline with decline in revenues
  → Long-term: able to attract new users, keep our end user base current, and increases recurring revenues (ratably recognized)

Our objective in this work

- Identify the key market forces at work in making the decision to own vs. rent
- Key equations and concepts that can help us understand the underlying economics
- Understand the key tradeoffs and frameworks
- Recognize the non economic factors which are also in play and their importance
# Accounting (financial) differences in owning vs. renting

<table>
<thead>
<tr>
<th></th>
<th>Owning</th>
<th>Renting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Purpose</strong></td>
<td>To buy assets that have useful life beyond current year</td>
<td>Ongoing costs to run a business</td>
</tr>
<tr>
<td><strong>How is it usually paid?</strong></td>
<td>Upfront lump sum (or financed with extra finance charge)</td>
<td>Regular payment schedule e.g. monthly mortgage</td>
</tr>
<tr>
<td><strong>When is it accounted?</strong></td>
<td>Over 3 to 10 years as asset depreciates</td>
<td>In the current month or year</td>
</tr>
<tr>
<td><strong>Where is it listed in financial statements?</strong></td>
<td>Balance sheet - Property or equipment minus depreciation</td>
<td>Income statement – operating costs</td>
</tr>
<tr>
<td></td>
<td>Statement of Cash Flows – listed under investing activities</td>
<td>Statement of Cash Flows – listed under operating activities (i.e. working capital)</td>
</tr>
<tr>
<td><strong>How is it treated for tax benefits?</strong></td>
<td>Over time as asset depreciates</td>
<td>Deducted in current tax year</td>
</tr>
</tbody>
</table>
Own vs. Rent – Mathematical Representation

Ownership

\[ P + \sum_{t=2}^{n} \frac{M_t}{(1 + r)^{t-1}} + \frac{U_c}{(1 + r)^f} \]

Renting

\[ \sum_{t=1}^{n} \frac{(R_t + V_t)}{(1 + r)^{t-1}} + S \]

- **P** = Year 1 cost of ownership (includes purchase price, initial set up and customization costs, other expenses like training etc.)
- **M\_t** = Annual maintenance payments
- **t** = Expected life of asset or time period of ownership evaluation
- **r** = Interest rate or cost of capital
- **U\_c** = Upgrade costs (e.g. SW and HW)
- **f** = Upgrade frequency

**Vs**

- **R\_t** = Annual rental or subscription includes any regular training and/or HW costs
- **V\_t** = Benefit or value from sharing model e.g. reduction in implementation or deployment etc.
- **S** = Initial set up costs for rental/subscription service (includes initial HW needs, training and customization etc.)
Model application: renting vs. owning a house

E.g. for a $1.5M single family home in Palo Alto for different home appreciation rates (G)

<table>
<thead>
<tr>
<th>Average Annual savings ($ thousand) from owning</th>
<th>Owning is better</th>
<th>Owning = Renting</th>
<th>Renting is better</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>$200</td>
<td>$400</td>
<td>$600</td>
<td>$800</td>
</tr>
</tbody>
</table>

Housing appreciation for Palo Alto (average annual rate, G)

<table>
<thead>
<tr>
<th>Last 2 years</th>
<th>Last 5 years</th>
<th>Since 1990 (also same for last 10 years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.1%</td>
<td>2.86%</td>
<td>4.55%</td>
</tr>
</tbody>
</table>

# Model application for Zip Car – Owning vs. Leasing a car

## Expenses

<table>
<thead>
<tr>
<th>Expenses</th>
<th>Monthly</th>
<th>Annual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle depreciation/Lease</td>
<td>$270.00</td>
<td>$3,240.00</td>
</tr>
<tr>
<td>Insurance</td>
<td>$99.00</td>
<td>$1,188.00</td>
</tr>
<tr>
<td>Parking</td>
<td>$125.00</td>
<td>$1,500.00</td>
</tr>
<tr>
<td>Gas</td>
<td>$45.00</td>
<td>$540.00</td>
</tr>
<tr>
<td>Maintenance</td>
<td>$36.00</td>
<td>$432.00</td>
</tr>
</tbody>
</table>

### Car ownership (1)

- Average replacement period for a car (3) 6 years
- Average annual increase in gas prices 3% inflation rate
- Average annual increase in insurance 3% inflation rate

### Zipcar model (2)

<table>
<thead>
<tr>
<th>One time</th>
<th>Annual</th>
<th>per hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Membership Fee</td>
<td>$60.00</td>
<td></td>
</tr>
<tr>
<td>Application Fee</td>
<td>$25.00</td>
<td></td>
</tr>
<tr>
<td>Usage rate</td>
<td>$10.50</td>
<td></td>
</tr>
</tbody>
</table>

(usage rate includes gas, parking, insurance, maintenance)

| Late fee | $50 |

### Usage profiles for Zipcar (annual hours)

- Assumed annual usage rate increase 5%
- Assumed 5 instances per year when late fee is paid

<table>
<thead>
<tr>
<th>Usage profiles for Zipcar (annual hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate usage</td>
</tr>
<tr>
<td>104 1 hrs per day, 2 days a week for full year</td>
</tr>
<tr>
<td>Medium usage</td>
</tr>
<tr>
<td>520 2 hrs per day, 5 days a week for full year</td>
</tr>
<tr>
<td>Heavy usage</td>
</tr>
<tr>
<td>1040 4 hrs per day, 5 days per week for full year</td>
</tr>
</tbody>
</table>

## Ownership model

<table>
<thead>
<tr>
<th>Year</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
<th>Year 6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$6,900.00</td>
<td>$7,005.24</td>
<td>$7,060.23</td>
<td>$7,116.88</td>
<td>$7,175.23</td>
<td>$7,235.32</td>
</tr>
</tbody>
</table>

Cumulative spend in ownership model

<table>
<thead>
<tr>
<th>Year</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$6,900.00</td>
<td>$13,905.24</td>
<td>$20,965.47</td>
</tr>
</tbody>
</table>

### Zipcar Model

- Annual spend @ moderate usage $1,427.00 $1,513.93 $1,574.13 $1,637.33 $1,703.70 $1,773.38
- Annual spend @ medium usage $5,795.00 $6,329.65 $6,630.63 $6,946.66 $7,278.50 $7,626.92
- Annual spend @ high usage $11,255.00 $12,349.30 $12,951.27 $13,583.33 $14,246.99 $14,943.84

Cumulative spend @ moderate usage $1,427.00 $2,940.93 $4,515.06 $6,152.39 $7,856.09 $9,629.47
Cumulative spend @ medium usage $5,795.00 $12,124.65 $18,755.28 $25,701.95 $32,980.44 $40,607.37
Cumulative spend @ high usage $11,255.00 $23,604.30 $36,555.57 $50,138.89 $64,385.89 $79,329.73

Model application: owning vs. renting a car (Zipcar Model)

Savings estimated for different usage patterns for rental service

- Average Annual savings ($ thousand) from owning

<table>
<thead>
<tr>
<th>Usage</th>
<th>Average Annual Savings ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heavy usage</td>
<td>$10</td>
</tr>
<tr>
<td>Medium usage</td>
<td>$6</td>
</tr>
<tr>
<td>Moderate usage</td>
<td>$2</td>
</tr>
</tbody>
</table>

Note: average replacement cycle for a car in US is 6 years.
Model application for Adobe Photoshop (consumer SW) pricing – license vs. creative cloud subscription

Ownership Model
Photoshop License Cost $600
Upgrade cycle (license model) 36 months assumption
Typical upgrade cost $200 assumption
HW upgrade needed $800 every 5 years, assumption

Subscription (Rental) Model
First year (monthly price) $10 discount first year
Regular monthly price $20
Increase in subscription price 10% price increase every 3 years

<table>
<thead>
<tr>
<th>Year</th>
<th>Ownership model - annual spend</th>
<th>Rental model - annual spend</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$600</td>
<td>$120</td>
</tr>
<tr>
<td>2</td>
<td>$0</td>
<td>$240</td>
</tr>
<tr>
<td>3</td>
<td>$0</td>
<td>$240</td>
</tr>
<tr>
<td>4</td>
<td>$200</td>
<td>$264</td>
</tr>
<tr>
<td>5</td>
<td>$800</td>
<td>$264</td>
</tr>
<tr>
<td>6</td>
<td>$0</td>
<td>$264</td>
</tr>
<tr>
<td>7</td>
<td>$0</td>
<td>$264</td>
</tr>
<tr>
<td>8</td>
<td>$0</td>
<td>$290</td>
</tr>
<tr>
<td>9</td>
<td>$0</td>
<td>$290</td>
</tr>
<tr>
<td>10</td>
<td>$0</td>
<td>$319</td>
</tr>
</tbody>
</table>

Ownership - cumulative spend: $600 + $600 + $600 + $800 + $1,600 + $1,600 + $1,800 + $1,800 + $1,800 + $2,800 = $14,500
Rental - cumulative spend: $120 + $360 + $600 + $864 + $1,128 + $1,392 + $1,682 + $1,973 + $2,263 + $2,583 = $14,057

Since the product offering remains unchanged from feature functionality perspective, there is no additional benefit to the consumer in subscription mode except maybe ease of access from anywhere.

Comments:
- SW Upgrade (Ownership) - $200
- HW Upgrade (Ownership) - $800
- SW Upgrade (Rental) - $20/month
- HW Upgrade (Rental) - $800 every 5 years

Model application: consumer software example

Note: example calculations for Adobe Photoshop license vs. rental model
Sharing/Rental models used by SW providers

Single System

Each customer has his own system, hosted on a dedicated hardware

Multiple Systems

Multiple systems share a hardware using virtualization technology or multiple installations

Multi-Client

Customers share one system using multi-client

Shared Repository

Customers have dedicated systems like in the multiple system case but the repository provides sharing of customer independent content
Discrete Scaling Out

The discrete unit of scale is a single server. The average cost per customer (over all servers) converges towards the average cost per customer for one fully utilized server.
Total cost of ownership (TCO) for serving customers for different sharing models – SW provider perspective

- For very small customers (5-25 users) and trial systems, multi-client provides dramatic savings.
- For mid-size customers (25-50 users), multi-client provides some benefits.
- For customers with more than 50 users, cost for different sharing models converge.
Model application: business software example

Background

- We will model three web application scenarios, map each scenario to a usage pattern, and compare the costs of running these applications on-premises vs. the equivalent cloud environment on AWS (either in AWS EC2 reserved instances or AWS EC2 OD instances).

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Potential Use Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steady state usage demand pattern</td>
<td>Typical corporate website</td>
</tr>
<tr>
<td>Spikey but predictable demand pattern</td>
<td>Seasonal promotions e.g. holiday sales</td>
</tr>
<tr>
<td>Uncertain and unpredictable demand pattern</td>
<td>Launch of a new offering which is not tested before, adoption is not clear upfront</td>
</tr>
</tbody>
</table>

- We model the application using simple compute and database resources all based on Linux OS.
- All calculations are based over 3 years.

http://media.amazonwebservices.com/AWS_TCO_Web_Applications.pdf
Model application: business software example

Scenario 1: Steady state usage demand

http://media.amazonwebservices.com/AWS_TCO_Web_Applications.pdf
Model application: business software example

Scenario 1: Server needs and cost estimates

<table>
<thead>
<tr>
<th>Server needs</th>
<th>On Premise</th>
<th>AWS - Option 1</th>
<th>AWS - Option 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All Reserved</td>
<td>All On-Demand</td>
<td></td>
</tr>
<tr>
<td>Web Servers</td>
<td>2</td>
<td>2 heavy utilization (3 yr term)</td>
<td>2 OD Instances</td>
</tr>
<tr>
<td>App Servers</td>
<td>2</td>
<td>2 heavy utilization (3 yr term)</td>
<td>2 OD Instances</td>
</tr>
<tr>
<td>DB Servers</td>
<td>2</td>
<td>2 heavy utilization (3 yr term)</td>
<td>2 OD Instances</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>On Premise</th>
<th>AWS - Option 1</th>
<th>AWS - Option 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All Reserved</td>
<td>All On-Demand</td>
<td></td>
</tr>
<tr>
<td>Server hardware</td>
<td>$306</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Network hardware</td>
<td>$60</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>HW Maintenance</td>
<td>$48</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Power and Cooling</td>
<td>$174</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Data Center Space</td>
<td>$144</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Personnel</td>
<td>$1,200</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>AWS Charges</td>
<td>-</td>
<td>$616</td>
<td>$2,131</td>
</tr>
<tr>
<td>Total Charges per month</td>
<td>$1,932</td>
<td>$616</td>
<td>$2,131</td>
</tr>
<tr>
<td>Total Over 3 years</td>
<td>$69,552</td>
<td>$22,176</td>
<td>$76,723</td>
</tr>
<tr>
<td>Savings vs. OP Option</td>
<td>-</td>
<td>68%</td>
<td>-10%</td>
</tr>
</tbody>
</table>
Model application: business software example
Scenario 2: Spikey but predictable demand

http://media.amazonwebservices.com/AWS_TCO_Web_Applications.pdf
Model application: business software example

Scenario 2: Server needs and cost estimates

<table>
<thead>
<tr>
<th>Server needs</th>
<th>On Premise</th>
<th>AWS - Option 1</th>
<th>AWS - Option 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All Reserved</td>
<td>All On-Demand</td>
<td></td>
</tr>
<tr>
<td>Web Servers</td>
<td>4</td>
<td>4 heavy utilization (3 yr term)</td>
<td>1 OD Instance base + as needed</td>
</tr>
<tr>
<td>App Servers</td>
<td>4</td>
<td>4 heavy utilization (3 yr term)</td>
<td>1 OD Instance base + as needed</td>
</tr>
<tr>
<td>DB Servers</td>
<td>2</td>
<td>2 heavy utilization (3 yr term)</td>
<td>2 OD Instances base</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>On Premise</th>
<th>AWS - Option 1</th>
<th>AWS - Option 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All Reserved</td>
<td>All On-Demand</td>
<td></td>
</tr>
<tr>
<td>Server hardware</td>
<td>$510</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Network hardware</td>
<td>$100</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>HW Maintenance</td>
<td>$80</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Power and Cooling</td>
<td>$290</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Data Center Space</td>
<td>$240</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Personnel</td>
<td>$2,000</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>AWS Charges</td>
<td>-</td>
<td>$988</td>
<td>$1,843</td>
</tr>
<tr>
<td>Total Charges per month</td>
<td>$3,220</td>
<td>$988</td>
<td>$1,843</td>
</tr>
<tr>
<td>Total Over 3 years</td>
<td>$115,920</td>
<td>$35,568</td>
<td>$66,348</td>
</tr>
<tr>
<td>Savings vs. OP Option</td>
<td>-</td>
<td>69%</td>
<td>43%</td>
</tr>
</tbody>
</table>
Model application: business software example

Scenario 3: Uncertain, unpredictable demand

http://media.amazonwebservices.com/AWS_TCO_Web_Applications.pdf
### Scenario 3: Server needs and cost estimates

<table>
<thead>
<tr>
<th>Server needs</th>
<th>On Premise</th>
<th>AWS - Option 1</th>
<th>AWS - Option 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>All Reserved</td>
<td>All On-Demand</td>
</tr>
<tr>
<td>Web Servers</td>
<td>7</td>
<td>7 heavy utilization (3 yr term)</td>
<td>OD Instances as needed</td>
</tr>
<tr>
<td>App Servers</td>
<td>7</td>
<td>7 heavy utilization (3 yr term)</td>
<td>OD Instances as needed</td>
</tr>
<tr>
<td>DB Servers</td>
<td>2</td>
<td>2 heavy utilization (3 yr term)</td>
<td>OD Instances as needed</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>On Premise</th>
<th>AWS - Option 1</th>
<th>AWS - Option 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All Reserved</td>
<td>All On-Demand</td>
<td></td>
</tr>
<tr>
<td>Server hardware</td>
<td>$816</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Network hardware</td>
<td>$160</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>HW Maintenance</td>
<td>$128</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Power and Cooling</td>
<td>$464</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Data Center Space</td>
<td>$384</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Personnel</td>
<td>$3,200</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>AWS Charges</td>
<td>-</td>
<td>$1,546</td>
<td>$1,048</td>
</tr>
<tr>
<td>Total Charges per month</td>
<td>$5,152</td>
<td>$1,546</td>
<td>$1,048</td>
</tr>
<tr>
<td>Total Over 3 years</td>
<td>$185,472</td>
<td>$55,656</td>
<td>$37,714</td>
</tr>
<tr>
<td>Savings vs. OP Option</td>
<td>70%</td>
<td>80%</td>
<td></td>
</tr>
</tbody>
</table>

Savings vs. OP Option: 70% for AWS Option 1, 80% for AWS Option 2.
Key challenges in renting/sharing

Psychological factors impacting ownership decisions

• Security of tenure
• Pride of ownership

Trust and reliability in rental services

• Reliability and reputation of the parties in the transaction
• Service and business disruptions e.g. AWS outages

Evolving rules and regulations

• Tax rules around income from sharing of assets
• Data and privacy regulations
Additional details: framework for ownership – Understand the variability in asset usage

**Steady state usage pattern**
Often high utilization with known demand → ownership is often better in these cases

**Spikey but predictable usage pattern**
Often associated with seasonal promotions or events → mix of ownership and rental (for spikes) is preferred

**Uncertain and unpredictable usage pattern**
Often associated with applications or trends that suddenly go viral → rental is preferred to avoid large upfront expense of ownership
A framework for determining ownership vs. rent

Asset ownership = \( f(U, \lambda, S, V) \)

Where:

- \( U \) = Current utilization of asset
- \( \lambda \) = Variability in usage of asset
- \( S \) = Scarcity or uniqueness of asset
  i.e. how easy is it to obtain or create
- \( V \) = Fraction of total value generated by the asset that is captured by its owner

Source: Competing on Resources, HBR and author analysis
Conclusions

• New models around collaborative consumptions are emerging largely due to the technology advancements

• These new sharing models have the potential to disrupt established industries ranging from transportation, software, to consumer goods like apparel

• However own or rent decisions need to include a long term perspective and consider many key aspects at play on both cost and benefits

• We believe that Own vs Share is an instance of a broader economic tradeoff that needs to be further investigated