



### **Analytics mindset: P-card**

**Adapted for “RSM371 Data and Information Management for Business Analytics”**

#### **Deliverables:**

- 1. Case Report including a detailed description of your findings. At most 3 pages + appendices.**  
In your report, only a discussion on the 4 Vs and a summary of your findings regarding task 5 is needed.
- 2. All Python source code either in a Jupyter Notebook (\*.ipynb) or a Python file (\*.py). One file!**

#### **Part I:**

##### **Background**

You work as an internal auditor for Oklahoma State University (OSU). You were asked to perform an audit of the purchasing cards (P-cards) that are used on campus. P-cards are a business credit card that some employees are permitted to use to purchase necessary goods and services. If employees agree to certain rules, they can then use a P-card to make appropriate business purchases rather than using their own credit card. This allows the employee to avoid spending personal funds and seeking reimbursement. It also provides the business with greater control because the business can institute internal controls to limit types of purchases and avoid inefficient and fraudulent transactions. Organizations also can track spending using detailed P-card records provided by the credit card companies.

You have been assigned the task of auditing all of OSU's P-card transactions for 2014. To perform this audit, you received a file of all P-card transactions for the entire state of Oklahoma (the state collects all transactions for state and higher education institutions).<sup>1</sup> This file will be described more in Part II.

The purpose of this case is to help develop your analytical mindset. An analytics mindset is the ability to:

- ▶ Ask the right questions
- ▶ Extract, transform and load (ETL) relevant data
- ▶ Apply appropriate data analytics techniques
- ▶ Interpret and share the results with stakeholders

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<sup>1</sup> The data for this case comes from the Purchase Card (P-card) Fiscal Year 2015 database and is made available under the Open Database License: <http://opendatacommons.org/licenses/odbl/1.0/>. Any rights to individual contents of the database are licensed under the Database Contents License: <http://opendatacommons.org/licenses/dbcl/1.0/>. The data for this case is made publicly available at <https://data.ok.gov/dataset/purchase-card-pcard-fiscal-year-2015>. Do not use the data set posted on the web. Use the one included by your professor because some of the transactions may have been changed or updated. Also, some data may have been altered, added or deleted to enhance learning objectives and, thus, you should not use the data to infer good or malicious intent by anyone listed in the data set.

For this case, you will perform the following tasks. Each task focuses on a different part of developing an analytics mindset.

- ▶ **Task 1** – Gain an understanding of OSU P-card guidelines and internal controls by reading the case.
- ▶ **Task 2** – Gain an understanding of the data used for testing.
- ▶ **Task 3** – Transform the data and load it into the appropriate tool for analysis, this means, Python.
- ▶ **Omitted and partially included in Task 5: Task 4** – Review or learn basic querying techniques. Covered in class using a variety of different examples.
- ▶ **Task 5** – Perform a test of various P-card internal controls.

### Task 1

This task focuses on the first bullet point of developing an analytics mindset — **Ask the right questions**. We strongly emphasize the importance of this principle *before* any data is analyzed. To apply data analytics correctly, it is critical to understand the business setting and your objectives in using data analytics.

The OSU P-card guidelines stipulate that “It is the intent of Oklahoma State University (OSU) to use a commercial purchasing card (P-Card) to facilitate the acquisition of lower dollar goods and services needed for conducting official University business.”

### Required

- ▶ Gain a more in-depth understanding of the OSU P-card guidelines and objectives by reviewing the P-card guidelines in the appendix following. As you review the guidelines, consider the risks OSU faces and what controls it has implemented around those risks.
- ▶ No written part required.

## Appendix

### OSU P-Card Guidelines

#### Using the P-Card

The cardholder is the only person authorized to make purchases using his/her card. Loaning a P-Card to another person may result in revocation of the card.

The fact that the cardholder has been issued a card does not imply prior approval of all purchases. The cardholder must follow applicable University policies and procedures and departmental procedures, including any departmental pre-approval procedure.

Many companies provide discounts through their Education Sales Department, so ask for that department.

There should be no up-charge by merchants to use the P-Card except where there are specific contractual arrangements with OSU to do so.

The following procedures should be followed for all purchases made by P-Card:

#### Decision to Use P-Card for Purchase

When making the decision whether to use the P-Card for a purchase, the cardholder should:

- Review the lists of prohibited and restricted purchases to ensure the purchase is allowable on the P-Card.
- Be sure the total amount will not exceed the cardholder's single transaction and/or cycle limit.
- Give fair treatment to all merchants and determine if the price obtained is reasonable.

#### Making the Purchase Using a P-Card

There are three main methods of making purchases:

Over the Counter – When making an over the counter purchase, the cardholder should:

- Verify the vendor accepts VISA. If the merchant accepts VISA, provide the P-Card for payment and make certain the merchant understands the purchase is exempt from sales tax. (The cardholder must have a copy of the Oklahoma Tax Commission Sales Tax Exemption Certificate for most merchants to exclude sales tax. This certificate can be downloaded from the Purchasing Department's website.)
- Verify no sales tax is included in the final purchase total before signing the sales receipt.
- Obtain a receipt at the time of purchase. (This receipt must be maintained as documentation with the cardholder's Bank Statement.)

Mail, Phone, or Fax – When placing an order by mail, phone, or fax, the cardholder should:

- Provide the merchant with the requested card information.
- Indicate to the sales representative or on the order form that OSU is a tax exempt institution. While OSU is not necessarily exempt from sales tax in other states, some vendors will not tax OSU.
- Provide the merchant with detailed shipping instructions to include your name, department name, phone number, and appropriate campus address.
- Obtain a confirmation number from the merchant and request that a receipt with itemized descriptions and pricing information be sent with the purchase.

- Retain appropriate documentation, including receipt / invoice and packing slip, of the purchase. (The documentation must be maintained with the cardholder's Bank Statement.)

Internet – When placing internet orders, the cardholder should:

- Use a reputable merchant and ensure purchases are made from a secure site or a site that provides account number encryption.
- If available, use the Educational section of the merchant's website.
- Complete the necessary order process and provide cardholder information to include the billing address that appears on the cardholder's bank statement.
- Verify no Oklahoma sales tax is included in the final purchase total before completing the order process.
- Print appropriate screens to include vendor name, date, item description(s), itemized cost, and total cost including shipping and handling.
- Retain appropriate documentation, including receipt / invoice and packing slip, of the purchase. (The documentation must be maintained with the cardholder's Bank Statement.)

### **Delivery Address**

Items purchased with the P-Card should always be delivered to a University address. Any exception must be approved in advance. If circumstances require goods to be shipped to an address other than a University address, a Request for Exception – Goods/Items to be Shipped to a Non-University Address Form must be completed and approved by the Associate Vice President and Controller. (This form can be found at <http://controller.okstate.edu/exceptions-forms-guidelines>.) The approved form must be maintained as a part of the purchase documentation and attached to the cardholder's Bank Statement.

### **Returns, Damaged Goods, and Credits**

Boxes, containers, special packaging, etc. should be retained until you have determined you are going to keep the materials. Some items, such as software or fragile pieces, cannot be returned without the original packaging material.

If the cardholder determines materials purchased with a P-Card need to be returned, the cardholder should:

- Work directly with the merchant.
- Carefully read all instructions enclosed with the order. A phone number and/or instructions for returning the materials are usually included on the receipt and/or packing slip.
- Request a Return Authorization Number from the merchant if required.
- Request a credit receipt for returned items. Some merchants may not provide this receipt unless it is requested.
- Determine if a restocking fee will be charged. If the merchant is responsible for the error or problem, you should not have to pay a restocking fee. If the merchant is not responsible, you may have to pay the restocking fee. A P-Card may be used to pay this fee provided it does not exceed your limits or violate policies.
- Check your monthly Bank Statements to ensure the charge for the returned item(s) is credited properly.

- Retain appropriate documentation of the return and associated credit. (The documentation must be maintained with the cardholder's Bank Statement.)

### **Backorders**

No charges should be incurred for back orders. Charges may only be applied for material that has been received by the University or shipped from the merchant's dock.

### **Card Denied**

If the P-Card is denied for any reason, the cardholder should contact Bank of America at the number on the back of the P-Card. Bank of America can provide the cardholder with the reason the card was denied. The cardholder may be asked to provide the name embossed on the card, the address listed on the P-Card application form, or the phone number listed on the P-Card application form. The cardholder can also check the Authorization Log in the Works system to determine the reason for the decline.

### **Transaction Flow**

A typical P-Card transaction consists of the following steps:

- Cardholder follows his/her department's pre-approval procedure.
- Cardholder makes a purchase from a merchant using the P-Card and obtains an itemized receipt.
- Merchant delivers the goods or service and submits the transaction to the credit card company.
- The bank pays the merchant.
- Cardholder reviews his/her transaction in Works, enters a detailed description and the purpose of the purchase, and signs off electronically on his/her transaction.
- The transaction is routed to the cardholder's approver. The approver reviews and electronically approves the transaction.
- The transaction is routed to the cardholder's accountant. The accountant reviews and electronically approves the transaction.
- Bank of America furnishes cardholder with a Bank Statement of purchases at the end of the billing cycle.
- Cardholder reconciles his/her receipts with the Bank Statement and forwards the Bank Statement, receipts, and other required supporting documentation to the cardholder's accountant.
- Accountant reviews the Bank Statement and all supporting documentation for completeness and compliance, and signs and dates the Bank Statement in a timely manner. Original records shall be maintained in a central location within the department. Within five (5) days of the end of the billing cycle, all transactions are reviewed, approved, and the account numbers and subcodes are updated. At the end of the five (5) day period, University Accounting downloads all transactions into the financial accounting system and makes a single payment to the bank on behalf of all OSU departments.

**NOTE:** The cardholder, approver, and accountant must be three different people and may only sign off in one role per transaction. Approvers and accountants may not sign off on their own transactions.

## Spending Controls

### Cardholder Spending Limits

Because OSU, not the individual employee, will pay for purchases made with the P-Card, authorization controls have been added to the P-Card accounts. These limits are imposed at the point of sale when the card is swiped or applied. The available limits on a P-Card include, but are not limited to:

- Credit Limit (dollar amount per cycle) – shall not exceed \$50,000
- Single Transaction Limit (dollar amount per transaction) – shall not exceed \$5,000

The single transaction limit includes shipping and handling charges or any applicable allowable transaction fee.

Individual cardholder limits are set by departmental administration and indicated on the P-Card application form. Departments will be required to provide justification for any monthly credit limit over \$10,000 for a cardholder. (For student employees, justification will be required for a credit limit over \$2,500 and a single transaction limit over \$500.)

### Merchant Activity Type Limits

OSU prohibits the use of P-Cards for certain types of transactions. Businesses are identified by Merchant Category Codes (MCC), a standard code the credit card industry uses to categorize merchants based on the type of goods or services provided by the merchant. MCC groups are defined for OSU by the Purchasing Department and are used to control whether a cardholder may purchase from a particular type of merchant. If an otherwise allowable P-Card purchase has been denied due to an MCC, contact the P-Card Administrator.

### Cardholder Limit Recertification

Cardholder limits will be reviewed annually to determine whether actual usage is consistent with a cardholder's spending limits.

- If the usage **is consistent** with the spending limits, there will be no change to the card limits.
- If the usage **is not consistent** with the spending limits, the P-Card Administrator will recommend an adjustment be made to the card limit(s), or recommend an inactive card be cancelled. If the department does not agree with the recommendation, departmental administration may file an appeal. The appeal must be in writing to the P-Card Administrator and should provide justification for why the card limit(s) should not be adjusted (or why the card should not be cancelled). Any appeal that cannot be resolved at that level will be forwarded to the Chief Procurement Officer for final determination.

## Cardholder, Approver, and Accountant Responsibilities

### Cardholder Responsibilities

When accepting a P-Card, the cardholder becomes an authorized purchasing agent for the University and has certain responsibilities. These include:

- Protection of the Card – The cardholder must protect the security of the P-Card and the card number. **The cardholder is the only person authorized to make purchases using his/her card.** If the card information is compromised or if the card has been lost or stolen, the cardholder must contact the card provider and also email the P-Card Administrator.
- Limitations on Merchants – Purchases from friends or family, from a company owned by any University employee, or from companies where the cardholder has a financial interest are prohibited using a P-Card. The cardholder must not accept any gift or gratuity from any merchant when it is offered, or appears to be offered, to influence the cardholder's decision regarding a P-Card purchase.
- Card Changes – The department is responsible for completing a Change Form if there are changes to card information, i.e. name change, credit limit change, change to the default account number, etc.
- Purchase Limitations – The cardholder accepts the responsibility for ensuring unallowable, prohibited, or restricted items are not purchased.
- Receipt Maintenance – The cardholder must ensure appropriate documentation, including the original invoice/receipt and packing slip, if applicable, is received and maintained for each purchase. The documentation is to be matched with the cardholder's Bank Statement and forwarded to the cardholder's accountant for review.
- Transaction Processing – The cardholder is required to complete P-Card training. The cardholder is responsible for timely review of his/her transactions in Works to verify the purchases are legitimate and in compliance with policy and procedures, the required supporting documentation is present, and a description of the purchase and business purpose has been entered in the description field in Works. The cardholder may be required to update account numbers and subcodes. Once the verification process is complete, the cardholder must sign off on the transaction in Works. At the end of each billing cycle, the cardholder must reconcile the individual receipts and supporting documentation with his/her Bank Statement to verify the purchases and returns are accurately listed, and forward the Bank Statement and all supporting documentation to his/her accountant.

### **Prohibited Purchases**

Certain types of purchases are prohibited by the State/State statutes. Certain purchases may be allowable if processed on a requisition, but may not be made with a P-Card.

A P-Card may **not** be used for the following:

- **Split Purchases** – Split purchasing means dividing or failing to consolidate a known quantity of goods or services for the purpose of evading the P-Card single transaction limit of \$5,000 and/or a quotation/bidding requirement. Examples include, but are not limited to; splitting an amount over \$5,000 between two (2) or more swipes of the card, splitting the purchase between two (2) or more cardholders, splitting the purchase between two (2) or more vendors, or splitting the purchase between

two (2) or more accounts or projects. Split purchasing is a serious violation of both OSU Policies and Procedures and State statutes.

- **Regular Monthly Payments > \$5,000 per Fiscal Year** – Maintenance, lease/rental, and service agreements for office or scientific equipment should be processed on a requisition and a PO issued if the total for the fiscal year is greater than \$5,000.
- **Sales Tax** – The cardholder is responsible for ensuring Oklahoma sales tax is not charged at the time of purchase.
- **Cash, Cash Advances, Automated Teller Machine (ATM) Transactions**
- **Donations / Sponsorships**
- **Gifts, Gift Cards, Gift Certificates** – The purchase of gifts is a violation of State statutes.
- **Expenses for food and mileage while in travel status** – Per diem for food expenses and mileage may be claimed on a travel voucher.
- **Items that do not Serve a Business Purpose** – Includes, but is not limited to, flowers, candy, meals, greeting cards, health care items, etc.
- **Personal Purchases** – **The P-Card may not be used under any circumstances to purchase items for personal use.**
- **Apple Products (For the Stillwater Campus Only)** – Apple products available through the Student Union Bookstore must be purchased through the Bookstore. Please refer to “Guidelines for Purchases of Apple Products” at <http://it.okstate.edu/facstaff/computers.php> for more information. (For associated data plans, see Restricted Purchases.)
- **Trade-in’s** – Includes any purchase involving the trade-in of a University asset.
- **Conflict of Interest Transactions** – A cardholder may not purchase goods or services from themselves or a member of their immediate family or realize personal gain on a purchase transaction. Potential conflicts of interest must be disclosed by the cardholder.
- **Any Purchase from a Company Owned by a University Employee** – Any purchase from any company owned by any University employee must be bid.
- **University Departments and/or Auxiliaries** – The campus vendor invoice (CVI) system is to be used for the purchase of goods or services from University sources.
- **Gasoline** – Gasoline should be purchased from Transportation Services or with the gasoline credit card provided with each University vehicle.
- **Mail, Postage** – All U.S. mail, including parcel post, certified, and registered mail, should be sent through University Mailing.
- **Weapons and/or Ammunition** – A requisition must be completed for the purchase of weapons and/or ammunition.
- **Moving Expenses** – A requisition must be completed for moving expenses for University employees.
- **Service and/or Incentive Awards (or Any Items Purchased for an Employee)** – Service and/or incentive awards (or any items purchased for an employee) must be processed on a requisition.



- **Late Fees**
- **Insurance** – Insurance must be processed on a requisition through Risk and Property Management.
- **Purchases for Student Organizations** – A tax exempt University P-Card may not be used to make purchases for student organizations. A fiduciary fund P-Card assigned to a student organization must be used.
- **Alcohol**
- **Decorations**
- **Personal/Individual Memberships** – Payment of personal memberships and dues are a violation of State statutes.
- **Prepayments or Deposits** – Prepayments and deposits are a violation of State statutes. *For determination of when subscriptions or registration fees (approved exceptions) may be paid in advance, see the Restricted Purchases section below.*
- **Salary / Wages and/or Benefits**
- **Other Purchases not Permitted under OSU Policies and Procedures, Purchasing Policies, and State Statutes**

#### **P-Card Violations**

Misuse of the P-Card in any manner by a cardholder may result in revocation of the privilege to use the P-Card, disciplinary action, termination of employment, and/or the pursuit of any legal action available to the University.

## Analytics mindset

### P-card

#### Part II:

#### Task 2

This task emphasizes the second bullet of developing an analytics mindset — **Extract, transform and load relevant data (ETL)**. Before using data for any analysis, it is imperative to understand the data. For this case, you have the following two data files:

- ▶ ***Analytics\_mindset\_case\_studies\_PCard\_FY2014.csv***
- ▶ ***Analytics\_mindset\_case\_studies\_PCard\_FY2015.csv***

Each data file contains all P-card transactions for one fiscal year (the fiscal year and calendar year are different). Combined, the data files contain all P-card transactions for fiscal years 2014 and 2015. The data files generally contain the following information (review each file carefully):

- ▶ **Agency Number:** This is a unique identifier for each agency. The number has no meaning other than uniquely identifying each state agency.
- ▶ **Agency Name:** This is the name of the government agency to which the employee belongs. Names are not necessarily unique.
- ▶ **Cardholder Last Name:** This is the last name of the person who is responsible for the P-card. Last names are not unique.
- ▶ **Cardholder First Initial:** This is the initial of the first name of the person who is responsible for the P-card. Initials are not unique.
- ▶ **Description:** This is a general description of the nature of the purchase.
- ▶ **Amount:** This is the amount charged to the P-card, denominated in dollars and cents. Negative amounts indicate a return and refund for the amount spent.
- ▶ **Vendor:** This is the name of the company that processed the charge.
- ▶ **Transaction Date:** This is the date the purchase was made. The date is accurate to the day, but not at a more refined level (e.g., hour or minute).
- ▶ **Posted Date:** This is the date the transaction was finalized and displayed for the customer.
- ▶ **MCC:** This abbreviation standards for merchant category code. It is a categorization made by the credit card company to group transactions from a vendor into primary categories.

One framework for understanding data is to consider the four V's of data: variety, velocity, veracity and volume. Here are a few examples of important questions to consider when evaluating the four V's of data.

► **Variety** – different forms and formats of the data

- Are all of the data set formats the same? Do they need to be the same for your analysis?
- Do all fields contain the same labels? Does the data with similarly titled labels contain the same type of data?
- Are all of the data formats the same? Do they need to be the same for your analysis?
- How are the files delimited? Are there any extra delimiters that may cause problems when importing? What strategies can you take to deal with any of these challenges?
- Are formats consistent for all entries in a field?
- Is the data structured or unstructured? What transformation would need to happen to any unstructured data to make it possible to analyze?

► **Velocity** – frequency of incoming data that needs processing.

Is your analysis performed on “live” data or only on historical data?

- How often will you be updating this analysis? How automated should the analysis be?

► **Veracity** – trustworthiness of the data

- Is the data you have complete? Do the data files you received contain all transactions? Are all of the data fields complete for each year and do the files contain all of the same data for each year?
- Does the data contained in the data files accurately represent the economic transactions?
- What human judgment went into establishing the data?

► **Volume** – the amount or scale of data

- Should you include data for all years?
- Should you include data from all entities in Oklahoma or only for OSU?
- Are all fields relevant to your analysis?
- How many rows will you need to import? What tools can handle this quantity of data?

**Required**

- Review the data and prepare responses to the questions above related to the four V's.

## Analytics mindset

### P-card

#### Part III:

#### Task 3

This task continues to focus on the second bullet point of having an analytical mindset — **Extract, transform and load relevant data (ETL process)**.

With an understanding of the business situation and the data, the next step is to prepare the data for analysis. In practice, preparing data follows the ETL process.

- ▶ Extracting data means acquiring data from wherever the data resides (e.g., databases, servers online).
- ▶ Transforming the data means preparing the data for analysis. This may entail such things as changing formats, combining data sources, aggregating or disaggregating data to the appropriate level, etc.
- ▶ Loading the data means importing the data into whatever tool you will use to analyze it (e.g., database, data visualization software or a statistics program).  
We will use Python for this purpose.

For this case, the data already was extracted from the state government database for you. You can assume that the extracted data is complete and accurate. That is, all transactions that occurred are actually in the files and each transaction represents what happened (e.g., the computer did not alter transactions). That does not mean every transaction is real (i.e., an employee may have created a fake transaction), there are no mistakes, there is no fraudulent behavior, etc. It only means that the *extraction* of information from the government database was complete and accurate.

Before transforming the data, it is important to understand what the data should look like when you are finished. The American Institute of Certified Public Accountants (AICPA) has produced voluntary, recommended data standards for the extraction of information. While not required, these data standards, combined with other standard industry practices, form leading practices about how to format data. Since the data files you received do not necessarily conform to these leading practices, you should transform the data to comply with these practices, except as noted below.

The full AICPA Audit Data Standards Library can be found at <https://us.aicpa.org/interestareas/frc/assuranceadvisoryservices/auditdatastandardworkinggroup>.

Relevant information for this case from the Base Standard is produced below.

- ▶ When dealing with flat files, the standards recommend using pipe-delimited, UTF-8 text files.

- ▶ Each file should include a header record that lists the field names for each data field. Field names should conform to the following specifications:

Data type	Standard
Text	Text is left or right justified with no leading or trailing blank spaces.
Numeric	<p>Currency symbols and thousands separators (for example, commas) should not be used.</p> <p>Decimal symbols must be included and must be a period (.).</p> <p>Decimals must be included for non-whole numbers.</p> <p>Negative numbers should be indicated with a minus sign (–) preceding the number.</p>
Date	<p>ISO 8601 – the date should be CCYYMMDD.</p> <p>For example, April 3, 1982, should be listed as 19820403 or as 1982-04-03. Note that if day is excluded, the format is YYYY-MM and should not be YYYYMM. This is to avoid confusion with some date formats that are still used but do not follow this pattern.</p> <p><i>Note that CC stands for century, and year can also be referenced as YYYY.</i></p>
Time	<p>ISO 8601 – time is represented in 24 hours (HHMM), for example, 1:00 p.m. is 1300.</p> <p>This can also be represented as 13:00. In either format, seconds may be omitted as shown here.</p>
Boolean	This is true or false.

Industry leading practice also suggests the following:

- ▶ Field names should not contain spaces. Instead of Customer Name as the field name, it should be CustomerName or Customer\_Name or customer\_name.
- ▶ Special characters (e.g., \$, &, %, commas or semicolons) should not be used in field names.
- ▶ Field names should be descriptive and provide some information about the information in the field. Abbreviations are acceptable to avoid long field names.
- ▶ Capitalization in field names can enhance readability. Instead of acctnumber, the title AcctNumber is easier to understand.

## Required

- ▶ Transform the data in accordance with the AICPA Base Standard, **except** as noted:
  - For this transformation, you should import all the data from each of the two files into a single repository. That means, regardless of the agency to which the data pertains, you should combine it into a single file.
  - Because of this stipulation, the quantity of data is close to what Excel can handle in a single sheet (namely 1,048,576 lines of data). Considering that we would like to include more than just two years into our data set, another tool is required here to work with the data.

- ▶ As you write your Python code, here are some important tips to keep in mind:
  - Although the AICPA data standards suggest pipe-delimited files (that is, files that use a vertical line delimiter instead of a comma or other delimiter), use a comma-delimited or .csv file for all parts of this case.
  - You should import all files into a single data set.  
Hint: Using pandas, datasets can be easily concatenated if they have matching column names:  
`dataset = pd.concat([dataset1, dataset2])`
  - For the TransactionDate and PostedDate, the format used is MM/DD/YYYY. For example, May 4, 2002, would be formatted as 05/04/2002. You need to ensure that the date is recognized correctly and the data type is date/time.
  - Not all fields are labeled as discussed in Task 2. Relabel data in all files using the labels that described the information in Task 2, but remove the spaces between the words (e.g., Agency Number should be AgencyNumber). Perform this step before merging the files into one.
  - Data might look different from year to year. You need to make it consistent across time.
  - If data is missing for a particular field, leave it blank in your database.
- ▶ When you finish the transformation, answer the following questions:
  - How many rows of data are contained in your final file?
  - What is the total of the amount column?
- ▶ Save a copy of your final output into a file.

## **Analytics mindset**

### **P-card**

#### **Part V:**

#### **Task 5**

One of the key objectives of your internal audit is to determine if employees of OSU are following internal controls.

#### **Required**

- ▶ You are only interested in transactions from OSU. Make sure to screen transactions so you only analyze those that pertain to OSU.
- ▶ Using only data for the 2014 calendar year, perform the tests listed below to analyze whether there are potential internal control violations. Use the following matrix to guide your analysis. The matrix is set up as follows:
  - The first column lists the internal control that should be operating.
  - The second column identifies the test you should perform to evaluate the control.
- ▶ Note that, although something is flagged as a potential internal control violation, it does not mean there has been a violation. There may be acceptable reasons for internal control deviations. The goal of this assignment is to identify higher-risk transactions, employees and vendors that should be targeted for additional testing. Carefully discuss your findings in the case report.

Internal control	Test to perform and desired output
1. User shall not spend more than \$5,000 per transaction.	Display all transaction details (Amount, Name, Description, Vendor, TransactionDate, PostedDate and MCC) for any transaction in 2014 that was for more than \$5,000. Sort by the total transaction amount in decreasing order.
2. User shall not spend more than \$50,000 per year.	Display the name and total amount spent during the year for all employees who spent more than \$50,000 in 2014. Sort by the total amount spent with the larger amounts listed first.
3. User shall not spend more than \$10,000 per month without approval.	Display the name, total amount spent during the month and the month for all employees who spent more than \$10,000 per month in 2014. Sort by month (January listed first) and then total the amount spent with the larger amounts listed first.
4. An amount more than \$5,000 should not be split between two or more swipes of the card by the same person.	Display all transaction details where the vendor and purchaser are the same on a specific day, there is more than one transaction for the day and the combined total of the transactions was more than \$5,000. Sort them in ascending order by the TransactionDate.
5. Continued from 4.	Count how often each individual purchaser did not follow the previous restriction. Sort this in descending order by the count.
6. <b>Bonus only! This part is NOT required!</b> Purchases should not be split between two or more cardholders.	Display all transaction information in which the combined total for a vendor on a day was more than \$5,000 and there were two or more different cardholders (make sure the query excludes individual people who may have made double (or multiple) payments) who made a purchase from that vendor. Sort them in ascending order by the TransactionDate.
7. Transactions are prohibited for expenses for food and mileage while traveling. A per diem for food expenses and mileage may be claimed using a travel voucher.	For the days when an employee makes a purchase using an MCC that contains the words hotel, motel, resort or inn, return all transaction details about any transactions for those employees who on those days also contain MCCs that have the words food or restaurant. Sort them in ascending order by name and then the amount.