# Auftrag 1: Einführung Grafikeditor

*Einleitung:*

Nachdem im Modul 226A die Grundlage des klassenbasierten Programmierens gelegt worden ist, geht es nun im Nachfolgemodul 226B darum, den letzten Schritt hin zur Objektorientierung zu tun. Während des gesamten Semesters werden die einzelnen Lernschritte mit Hilfe eines anschaulichen Praxisbeispiels, dem Programm „Grafikeditor“ nachvollzogen.

Für die nächsten Lektionen steht zuerst die sogenannte Vererbung auf dem Programm, mit der Sie bei richtigem Einsatz erreichen können, dass sehr viel redundanter Programmcode aus Ihren Programmen verschwindet.

## Aufgabe 1: Das semesterbegleitenden Programm Grafikeditor

*Einleitung:*

Während des gesamten Semesters werden die neuen Inhalte mit Hilfe des Programms „Grafikeditor“ erarbeitet. Es ist daher sinnvoll, einen kurzen Überblick über das Programm zu gewinnen.

*Aufgabe:*

Im Screencast „Einführung Grafikeditor.mp4“ in den Ressourcen, wird ein kurzer Überblick über den Grafikeditor gegeben. Schauen Sie sich diesen an.

## Aufgabe 2: Vererbung (Alternativ kann auch die Aufgabe 3 gelöst werden, oder natürlich beide. Die Aufgabe 2 wird auf dem nächsten Arbeitsblatt weitergeführt.)

*Einleitung:*

K 1.1

Mittels Vererbung kann in objektorientierten Programmen redundanter Code vermieden werden, indem neue Klassen auf der Basis bereits vorhandener Klassen definiert werden.

In dem Dokument „Einführung Vererbung.ppt“ in den Ressourcen werden kurz die Grundgedanken zur Vererbung skizziert. Sehen Sie sich dieses Dokument an.

Für die Lösung der nachfolgenden Aufgabe sollen folgende Anforderungen umgesetzt werden:

* In einer Firma arbeiten viele Angestellte, dies an verschiedenen Positionen.
* Es gibt Chefs, die eine Abteilung leiten.  
  (z.B. Walter Müller 32, leitet die Abteilung Einkauf, Beatrice Sattler 25, leitet die Abteilung Verkauf und die Lernendenausbildung …)
* Es gibt Fachangestellte, die einen bestimmten Chef als Vorgesetzten haben.  
  (z.B. Monika Bircher 101 und Peter Walter 98 mit Chef Müller, Thomas Klein 17 und Sabine Gerster 52 mit Chef Sattler, ...)
* Ausserdem werden in dieser Firma auch Lernende ausgebildet.  
  (z.B. Kevin Künzi 95 im 3. Lehrjahr, Sabrina Stäger 107 im 1. Lehrjahr, …)
* Wie in den oben genannten Personenbeispielen zu sehen ist, haben alle Angestellten der Firma eine Personalnummer.
* Zusätzlich zur Personalnummer sollen jeweils auch Namen und Vornamen der Personen ausgegeben werden können.

*Aufgabe:*

1. Informieren Sie sich im Screencast „Analyse Grafikeditor.mp4“ in den Ressourcen, wie man bei verschiedenen Klassen redundante Informationen identifiziert und daraus Oberklassen (Basisklassen) und Unterklassen (abgeleitete Klassen) herleitet.
2. Stellen Sie analog der Analyse des Grafikeditors eine Tabelle mit den notwendigen Eigenschaften der Klasse Chef, Fachangestellter und Lernender auf.

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1. Zeichnen Sie nun diese drei Klassen in ein UML-Klassendiagramm (analog der Analyse des Grafikeditors). Zeichnen Sie alle Attribute mit Datentypen ein. Identifizieren Sie die redundante Information und verschieben Sie diese in eine Basisklasse. Ergänzen Sie das Diagramm mit den korrekten Vererbungspfeilen.

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## Aufgabe 3: Vererbung (Alternative zur Aufgabe 2)

*Einleitung:*

K 1.1

Bei der Definition von Klassen orientiert man sich oft an Begriffen aus der realen Welt. So wurden beispielsweise im Modul 226A Klassen für die Kontos und Kunden einer Bank eingeführt. Nachfolgend finden Sie ein Klassendiagramm, welches diese Klassen mit ihren Attributen und Beziehungen zeigt. Zusätzlich ist eine Klasse Bank, welche als Container für Kontos und Kunden dient, eingezeichnet.



*Aufgabe:*

Zeichnen Sie obiges Klassendiagramm neu, so dass folgende Anforderungen berücksichtigt werden:

* Ein Kunde kann mehr als ein Konto haben.
* Die Bank unterscheidet bei den Kunden zwischen Privatpersonen und Firmen.
* Zu einer Privatperson gehören Namen, Vornamen, Adresse und AHV-Nr.
* Zu einer Firma gehören Namen, Adresse und MwSt-Nr.

1. Zu einer Adresse gehören Strasse und Ort.
2. Eine Firma kann zusätzlich null oder mehrere Zweigadressen haben.

Als weitere Anforderung gilt: In Ihrem Klassendiagramm sollen keine Redundanzen vorkommen.

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## Aufgabe 4: Komposition versus Vererbung

*Einleitung:*

K 1.2

Im Dokument „Einführung Vererbung.ppt“ wurde darauf hingewiesen, dass in bestimmten Fällen eine sogenannte Komposition der Vererbung vorzuziehen ist (Folien 7 und 8).

*Aufgabe:*

Überlegen Sie sich ein eigenes Beispiel, bei dem die Sachverhalte durch eine Komposition besser darstellt werden können.

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